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The Builder

AN

ILLUSTRATED WEEKLY MAGAZINE

FOR THE

ARCHITECT, ENGINEER, ARCHÆOLOGIST, CONSTRUCTOR, SANITARY REFORMER, AND ART-LOVER.

CONDUCTED BY

H. H. STATHAM,

FELLOW OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

"Every man's proper mansion-house, and home, being the theater of his hospitality, the seate of selfe-fruition, the comfortablest part of his own life, the noblest of his sonne's inheritance, a kinde of private princedome, nay, to the possessors thereof, an epitome of the whole world, may well deserve, by these attributes, according to the degree of the master, to be decently and delightfully adorned."

"Architecture can want no commendation, where there are noble men, or noble mindes."—SIR HENRY WOTTON.

"Our English word TO BUILD is the Anglo-Saxon Býlðan, to confirm, to establish, to make firm and sure and fast, to consolidate, to strengthen; and is applicable to all other things as well as to dwelling-places."—DIVERSIONS OF PURLEY.

"Always be ready to speak your mind, and a base man will avoid you."—WILLIAM BLAKE.

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Architecture from a Cosmical Point of View.

THE turn of the year, when one thinks what it really means, is an event that may very well draw our thoughts away beyond the mere daily necessities and fashions of architecture to a consideration of the subject in a wider and more abstract sense. To most of us, in our every-day attitude of mind, the New Year is a date merely, a marking off of a fresh division of our time, another milestone in the race of life (which in itself is a serious consideration enough, no doubt); also an excuse for a holiday, a little relaxation of business, a fresh interchange of friendly or neighbourly greetings and hospitalities. But when we think for a moment what it is which has marked out the interval for us,—the traversing by our planet of one more of its elliptical circuits round the sun,—we seem to be carried in thought somewhat beyond the annual amenities of New Year's Day. We are reminded thereby of our connexion with the great mechanism of the solar system, so vast to our perception, so small in comparison with the universe of suns on whose movements we can but partially speculate. Regarded from this point of view, the earth is no more a surface on which cities may grow up, mansions and town-halls be erected, and land laid out for building estates; all these transactions become infinitesimal from the cosmic point of view; trivial and impertinent details, hardly perceptible at all in the general contemplation of our sphere as one among "flying synods of worlds."

There is only one sense in which architecture retains its dignity and importance even from this point of view; so far, namely, as it is the expression of an abstract thought or ideal. Amid the multifarious demands of practical life, and the limiting conditions of practical achievement, it is but seldom—in these bustling and hurrying modern days hardly ever—that architecture can rise entirely above utilitarian considerations and exist solely as an intellectual expression. But so far or so often as it can do this, it is in a certain sense independent of mere scale. Thought is not measurable by a material scale.

> "A sphere is but a sphere;
> Small, Great, are merely terms we bandy here;
> Since to the spirit's absoluteness all
> Are like."*

Ideal architecture in its purest form becomes not the mere construction of a shelter, however elaborate or picturesque, but the expression of an aspiration or a mood of the mind. It may even have a relation with the cosmic spectacle, if it is regarded as the effort of man to express in his own way something of the grandeur and the hidden meaning which he has learned to discern in nature. In such a light the structures raised on the face of a planet by its inhabitants, infinitesimal as they are in comparative scale, may partake somewhat of the greatness and mystery of the scheme of nature which inspired them; and if we could imagine the various planets of our system to be in the same stage of habitability, and could visit them one by one, we might find it not the least interesting part of the investigation to compare the various ways in which mental thought and aspiration expressed themselves in structures raised solely for the satisfaction or embodiment of an ideal; to note, according to Wordsworth's fancy, how

> "Swift Mercury resounds with mirth,
> Great Jove is full of stately bowers."

As a matter of fact, probably, it must be many and many an age before the surface of Jupiter is contracted into ground solid enough for foundations; and an aqueous architecture is at all events beyond our present powers of conception. Nor indeed can we realise the least in imagination what entirely different possibilities of architectural expression may exist in planets of different conditions as to chemical composition and modulus of gravitation. Our forms of architecture seem varied enough; they may however be far more restricted in idea and conception than we are in the least aware of, in comparison with possible combinations which have never

* "Sordello," Book VI.

entered our human conception. Such as they are however, some of them may have a deeper significance than is commonly attached to them, where they have really been the outcome of the effort to give form to an abstract idea, to express a thought which may in a typical sense be indicated in architecture, although in a material sense, like Milton's gate of heaven,

"Inimitable on earth
By model or by shading pencil drawn."

If these are deemed profitless speculations, at all events it seems that we are not alone in indulging such, for with the New Year there comes to us a small book* specially concerned with "architecture, mysticism and myth," and by an architect who is no mere speculator, but one of the best draughtsmen and most artistic designers among the younger generation of English architects. The main point of Mr. Lethaby's fanciful but interesting little book, as stated in the introductory chapter, is that the usual history of Architecture, "with its theory of utilitarian origins from the hut and the tumulus," is rather the history of building; that architecture "is thought behind form, embodied and realised for the purpose of its manifestation and transmission."

"Of the modes of this thought we must again distinguish; some were unconscious and instinctive, as the desire for symmetry, smoothness, sublimity, and the like merely æsthetic qualities, which properly enough belong to true architecture; and others were direct and didactic, speaking by a more or less perfect realisation, or through a code of symbols, accompanied by traditions which explained them. The main purpose and burthen of sacred architecture,—and all architecture, temple, tomb, and palace, was sacred in the early days,—is thus inextricably bound up with a people's thoughts about God and the universe."

The author goes on to urge that there is evidence of a "cosmical symbolism" in the architecture of the early world, and that the intention of the temple idea was "to set up a local reduplication of the temple not made with hands, the World Temple itself." Mr. Lethaby goes on to follow up this idea by tracing out the symbolism of various forms of ancient architecture; and though in his preface he disclaims the possession of the learning which may be thought necessary for the treatment of such a subject, he at all events brings together a great many curious facts and fancies from many writers, and brings out a great many curious resemblances and hints from ancient buildings of different styles and peoples. The relation of the placing and designing of ancient buildings to the sun and the sunrise, of which he gives many examples, is a study which has quite recently passed from the domain of fancy into that of scientific and historical investigation, and probably there are many more facts to be brought to light yet upon this interesting and suggestive subject. Among the chapters is one on "Pavements like the Sea," and a succeeding one on "Ceilings like the Sky." In regard to this last subject Mr. Lethaby observes that "it may be said that at great periods of architecture ceilings were always skies," *i.e.*, studded with stars or with some similar suggestive decoration. This is going perhaps a little too far, unless we are to suppose that the author does not mean to include Greek architecture among great periods of architecture. Such an idea is not in keeping with the genius of Greek architecture; nor, we observe, does he bring forward any suggestion or example of such an idea from Greek buildings or literature. The idea is Egyptian, Byzantine, and Mediæval, but distinctly not Greek, though the placing or orientation of the Greek temples in regard to the position of the heavenly bodies appears likely to be more and more supported by evidence the more the question is looked into. This practice they very probably derived from the Egyptians. In regard to the Egyptian treatment of the ceiling Mr. Lethaby quotes from Champollion: "The Egyptians compared the sky to the ceilings of an edifice, and those of the greater part of the temples are painted blue, powdered with stars. . . . The goddess of the sky is figured under the form of a woman, whose body, placed horizontally, and out of all proportion long, embraces a large space, circumscribed by the legs and arms, which are vertical." A sketch of such a figure is given; we are not told whence it is taken. In a less symbolical and more material, but certainly more architectural sense, it may be rationally supposed that the first idea of the dome, which is a feature more easily treated for internal than for external effect, was a derivation from the dome of the sky. All these ideas, as Mr. Lethaby does not fail to remark, belong essentially to a time when the earth was regarded as a fixed plane with the sky as a solid sphere extending over it, in which the stars were set. The modern scientific cosmogony has made sad work of all these old picturesque ideas of the universe, which lent themselves far better to typification or imitation in architecture than does the modern cosmogony.

In some chapters, as in that on the planetary spheres, the author rides his subject rather too far. The curious fact of the influence of the number seven on the mind of the ancient world is indubitable, but it is not easy to be sure whether it was the cause or the effect of some of the ancient fancies. To commence with the statement that "the number seven is written in the sky," that is, in the supposed seven planets, is a rather curious ignoring of the fact that all this is altered long ago; and in commenting on the fact that the Great Bear, "probably the first known and named of the constellations" is represented by seven stars, the author leaves us in doubt whether he means to imply that the collocation of these seven stars was one of the influences in giving importance to that number, or whether seven stars were selected to define a constellation in consequence of a previous attachment to the number seven. All this about the importance of the number is of course pure mysticism, which has nothing really to do with the typifying of abstract ideas on architecture, though it is interesting to study the various ways in which the worship, as we may call it, of the number seven can be traced. A more interesting subject, because less hackneyed, is that of ancient ideas as to the centre of the earth, by which of course the ancients meant the central spot upon the supposed flat surface of the earth. A diagram is given illustrating the fable of how the true centre of the earth was determined by two eagles being sent by Jupiter to fly, one from the east the other from the west, the spot where they met being the centre; but as in some other cases, the author does not make it clear whether the illustration is taken from any ancient representation or is merely his own way of illustrating the idea in drawing. The drawing, in outline, represents a kind of half-egg-shaped stone with the flat side downwards, and a bird on each side. It may be observed that Browning, whom nothing seems to have escaped, brings in this legend as an illustration in the sixth book of "Sordello"—

"So, says
Old fable, the two eagles went two ways
About the world: where, in the midst, they met,
Though on a shifting waste of sand, was set
Jove's temple."

All this is merely mysticism, no doubt, and seems far enough from architecture in any sense; but it takes its part in what the author states is the central object of his book, to show "the influence of the known and imagined facts of the universe on architecture." The moral of this (for there is a moral in the book) is that architecture should still be designed, in its highest forms, under the influence of and with some relation to the known and imagined facts of the universe; in fact, that the highest significance of architecture is not attainable otherwise; that it must have a symbolism, immediately comprehensible by the great body of spectators. But of what kind, and in what relation to the "facts of the universe" as at present "known," Mr. Lethaby does not offer to define. What he does say is rather negative than positive: "No terraced temples of Babylon to reach the skies, no gold-plated palaces of Ecbatana, seven-walled; no ivory palaces of Ahab, nor golden houses of Nero with corridors a mile long," all which were the production of the times of despotism and forced labour. That difference we can all see: architecture was once for the tyrant or aristocrat, and must in future ages be for the people, who have not shown hitherto much longing for architecture poetry and magnificence, for buildings designed in relation to and symbolical of the known facts of the universe. And one difference between the ancient and the modern life seems to be at present, that we have not even time to think of and contemplate architecture in the abstract and ideal spirit: everything is swallowed up in utility. As Matthew Arnold puts it

"We say that repose has fled
For ever the banks of the River of Time;
That cities will crowd to its edge,
In a blacker incessanter line,
That the din will be more on its banks,
Denser the trade on its stream,
Flatter the plain where it flows
Fiercer the sun overhead;
That never will those on its breast
See an ennobling sight
Drink of the feeling of quiet again."

So one is often tempted to think now; but we do not know what higher and more widely-distributed education may bring forth in time, and whether the human race in the future may not still rise to the conception that there is something more in architecture than to afford work for the quantity-surveyor and the contractor. Possibly it may be thought that, even in that case, the symbolism of nature is too fanciful and unpractical an element to find favour in these enlightened days. But the fact, which Mr. Lethaby's book reminds us of, that this semi-mystical element and meaning once so largely permeated architecture, is significant in itself, and not without suggestiveness for the present day. Architecture at all events *once* meant more than meets the eye, and was connected in the minds of men with the order of the universe, as they understood it. It is as well to be reminded that such an ideal meaning, such a cosmic significance, was once recognised in architecture, and might again afford it, in a changed form, a new and higher significance than attaches to mere stone and mortar, and pilasters and colonnades. The possibility of the revival of such a higher symbolism in the art at all events forms a not unsuitable subject of speculation for the New Year, when our thoughts naturally turn towards the future developments which Time has in store for every phase of human craft or invention, Architecture among the rest.

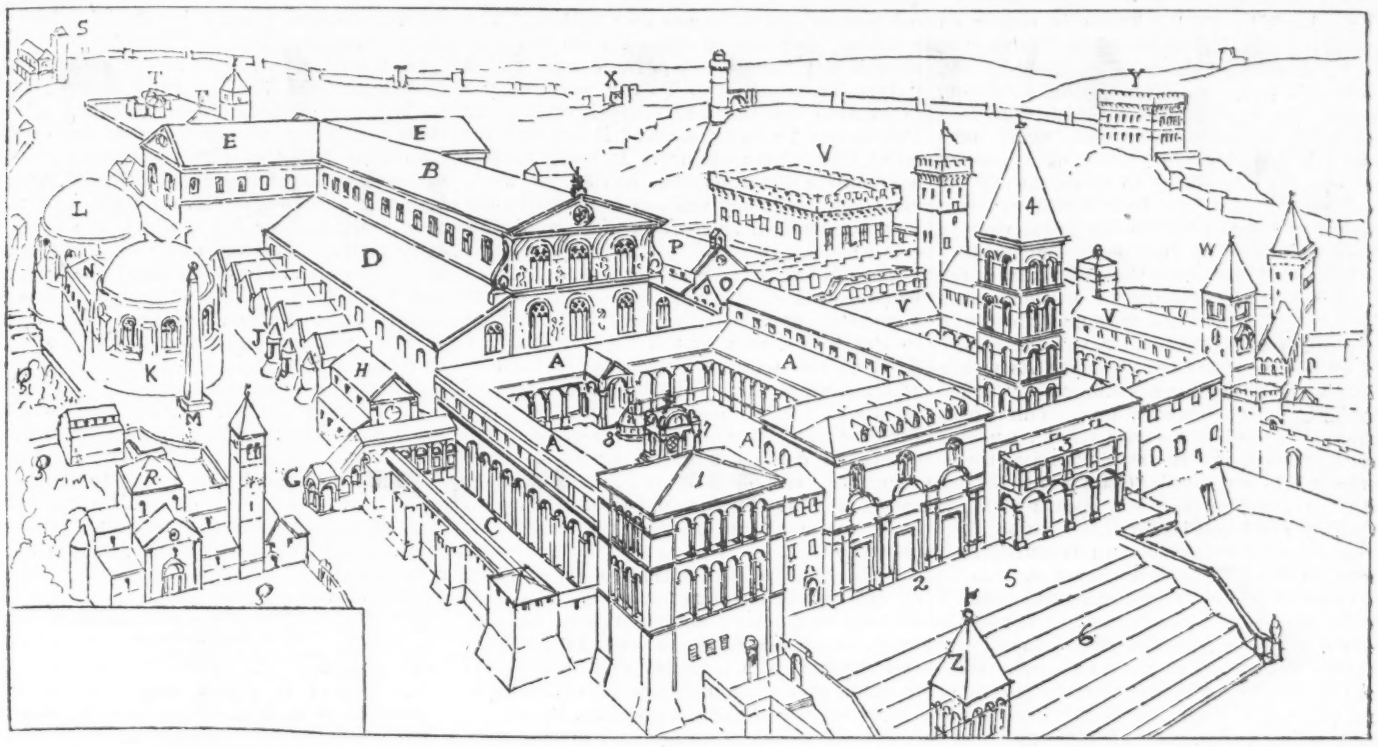
* "Architecture, Mysticism, and Myth." By W. R. Lethaby. London: Percival & Co.

OLD ST. PETER'S, ROME.

BY MR. H. W. BREWER.

GRAND as the modern Vatican Basilica undoubtedly is, yet the archæologist and historian must always regret that the ancient church, the site of which it occupies, has so entirely disappeared. When one contemplates the fact that down to within four centuries of our own times there existed a vast, complete ecclesiastical edifice of the age of Constantine, very slightly altered from what that Emperor left it,—a building which preserved all the main characteristics of its original design, the largest ancient church of early Christian times, no architectural splendour, not even Michelangelo's glorious dome, can compensate for its loss.

It is a remarkable fact that all through the Middle Ages, down to the dawn of the Renaissance, it never seems to have entered into the minds of the Pontiffs to rebuild the old Vatican Basilica; even the glories of Venice, Milan, and Florence, to say nothing of the noble Gothic cathedrals of the north, could not tempt them to rebuild the great,



REFERENCES.

A. The Quadriporticus.
B. Nave of the Basilica.
C. Space where Paul III erected the Chapel of the Archconfraternity of S.S. Sacrament.
D. Aisles of the Basilica.
E. Transept of the Basilica, or "Transverse Nave."
F. The Lady Chapel erected by Probus and Proba.
G. Entrance used by the Popes when they resided at the [Lateran.
H. Chapel called the Secretarium.
J. Place where Sextus IV. built the Canon's Chapel.
K. Church of "Sta. Maria de Febribus." Afterwards used as the Sacristy of St. Peter's.
L. Church of St. Petronilla.
M. The Vatican Obelisk, called "La Giulia."
N. Chapel and Tomb of St. John Chrisostom.
O. Chapel and Tomb of St. Gregory the Great.
P. The "Jerusalem Church."
Q. Campo Santo.
R. St. Salvator de Ossibus.
S. Monastery of St. Stephen.
T. Ancient Chapel and Cemetery, called "Fons Petri."
V. Ancient buildings of the Vatican.
W. "Orologium," or clock-tower, of the Vatican.
X. Porta Pertusa.
Y. The Belvedere.
Z. Church of St. Gregory in Platea.
1. "Church of St. Appolinaris," or Hospitium for Pilgrims.
2. Entrance Gateway, or Propylæum.
3. Loggia from which the Popes gave Benediction.
4. "Turris Cymbalaria" (Bell-Tower).
5. Platform in front of Basilica.
6. The Five Flights of Marble Steps.
7. The Pine-Cone from the Mausoleum of Hadrian.
8. The Cantharus, or Fountain.

Key Sketch to View of Ancient Basilica of St. Peter, Rome.

rude, and somewhat barbarously-constructed old building.

Grimaldi, in his "History of the Vatican Basilica," refers to these facts.

Of course, various minor alterations and additions took place, from time to time, in the ancient Basilica, but the main fabric remained whole and entire as it had been constructed by Constantine, certainly down to the time of Nicholas V. This Pontiff has been usually accredited with the idea of the erection of the modern St. Peter's and the destruction of the ancient church, but there does not really appear to be any warrant for the statement.

Undoubtedly, in the time of Nicholas V. the old Basilica, which, Grimaldi says, had from the first been hastily constructed, and to a large extent from the materials of old classical buildings, had become decayed; in fact, some portion of it,—I am inclined to think the great apse or tribune,—had fallen down, and Nicholas V. had called in the celebrated architects, Leo Battista Alberti and Carlo Rosellino, who seem to have drawn up a report upon the condition of the building; what else they did is very doubtful. Either, however, in the time of Nicholas V. (whose pontificate extended from 1447 to 1455) or shortly after, the great transept of the church was pulled down, the altars, monuments, and other objects of art which it contained being rebuilt in the nave, evidently with the intention of replacing them in their original situations when the works of restoration or rebuilding had been completed. That this work was partially, if not wholly, carried out, is quite certain, because, on the reverse of a medal struck by Paul II. is a very interesting representation of the tribune or apse of St. Peter's as erected by that Pontiff. The inscription round it reads as follows: "Anno Christi MCCCCLXX has ædes condidit," and in the arch over the tribune is the inscription, "Tribuna S. Petri," and below it the word "Roma." The tribune is here shown with a semi-dome above it, inlaid with mosaic, and a great baldacchino of a simple early form below it. Evidently the whole thing was an attempt to reconstruct the old tribune. There are two very interesting early drawings showing the church at about this period. One has been republished by De Rossi and the other is engraved in the "Nuremberg Chronicle." Both of these show St. Peter's without transepts, but prove that in all other respects the church and its remarkable forecourt, or "quadriporticus," remained pretty much in their original condition. With the pontificate of Julius II., however, an entirely new state of things set in, and in 1506 Bramante commenced the present gigantic edifice, pulling down all the work which had been constructed by Nicholas V., Paul II., and other Pontiffs down to his own time. The great nave and aisles, the quadriporticus, and the lofty campanile were, however, not interfered with, and remained, with certain alterations and additions, down to the time of Paul V. (1605), who, with Carlo Maderno as his architect, perpetrated the terrible mistake of putting up the vast east front of the modern Basilica, which not only destroyed the symmetrical arrangement of Michelangelo's plan, but also necessitated the entire destruction of the old Basilica, which would not have been the case if Michelangelo's short nave had been adhered to.

There are a great number of drawings in existence showing the old church as it stood, with Michelangelo's dome and transepts rising up behind it. Amongst the most interesting are the following. The plan and views by Giulio Ballino (1567); by Marius Kartarus (1575); and a large view of the City of Rome, dedicated to Henry III. of France, by Antonio Lafrario (1577); also a view published in 1580, evidently taken from a much earlier drawing; also in the following works—Ciampini "De Sacris Edificiis a Constantino Magno Constructis," 1688; "Bonanni Templi Vaticani Historia," 1696; and "Fontana de Obilisco Vaticani," &c.

In many of these views we see the quadriporticus and the great nave and aisles of the old church, with the various additions that had been made to it from time to time. Although the eastern and western sides of the quadriporticus were unaltered yet, the north and south had been encroached upon by various structures. Upon the space marked C in our key-sketch, Paul III. (1503), had erected a large chapel with an elaborate Renaissance front projecting right across the south walk of the quadriporticus, and on the opposite side a large building called the "Auditorium Rotæ" was constructed by Innocent VIII. (1484-1492) which must have blocked up a considerable portion of the north walk.

The series of buildings forming the east front of the quadriporticus are shown in the earlier views, as represented in the drawing. To the extreme south-east (see I. in the sketch-plan) stood a quadrangular structure, with open arcades to the upper stories, which is described by Ciampini as the "Church of St. Appolinaris," but Bonanni, with greater probability, says that it was a Hospitium, erected by Leo III. for pilgrims. It was subsequently restored by Paul II., when, in all probability, the Renaissance doorway and windows, shown in the later drawings, were added. The arcaded stories above look like the old work of Leo III.

In the centre of the eastern front of the quadriporticus stood the great entrance gateway (fig. 2, sketch-plan), with three bronze doors. The arches and columns appear to have been Constantine's work, but the upper portion of the building had been covered by mosaic work, and Gothic windows introduced during the fourteenth century. To the north of this was a sort of open loggia (fig. 3). In the earlier views this is shown as a simple arcade with a balcony over it, protected by a penthouse roof, but in the later views, which are made from drawings executed by order of Sextus V., a much more important structure is represented, with regular Renaissance pilasters and friezes; an alteration which was carried out between the pontificates of Sextus IV., 1471, and

Alexander VI., 1503. There is rather an interesting question about this. The view in the "Nuremberg Chronicle," published 1494, shows this structure in its original condition, so that the drawing from which that very interesting engraving was made must have been taken at least a quarter of a century earlier,—I am inclined to think during the pontificate of Pius II. It is corroborated in nearly every detail by the Mediæval view of Rome, published by De Rossi. Immediately behind this loggia rose the lofty campanile, called "Turris Cymbalaria" by earlier writers (fig. 4). Although this was undoubtedly a lofty and beautiful structure, yet, surely, the old writers must have exaggerated its merits when we find Blondus affirming that "Talem Turrim Campanariam omnium primam in orbe terrarem fuisse!" Another writer, Angelus Rocca, states that "it was the loftiest tower in the whole world!!" Ciampini, however, with his usual moderation, speaks of it as "Quidem non humilis Turris." The building is very carefully described in Bonanni, in a quotation from Tiberius Alpharanus, who, in the reign of Sextus V., collected together all the drawings and manuscripts relating to St. Peter's. In fact, as neither Ciampini nor Bonanni themselves saw the ancient church, most of the facts which they state are taken from Tiberius Alpharanus, Turregio, and other earlier writers, whereas their plans and views are copied from drawings, either collected together or prepared under the direction of Tiberius Alpharanus. It is but just to both writers to say that they acknowledge their obligations.

From Bonanni's description of the tower we gather that it stood four stories high above the roof of the quadriporticus, that in each story were eight two-light windows, with double columns and Gothic tracery, but Bonanni says that it was crowned by a dome and not by a spire, and undoubtedly the drawings executed in the pontificate of Sextus V. agree with his description in every particular, but the earlier views agree in showing it crowned by a pyramidal spire; and as Tiberius Alpharanus says, that the tower was restored in 1574, and there can be little doubt that the domical top, which has a very Renaissance appearance about it, was an addition of that date. The tower was constructed originally by Leo IV., in 1303, but, according to a writer of the name of Rutilius Albrinus, it was struck by lightning in the year 1333, when the bells were melted, and the whole was not restored until 1353. It may be a question whether there were not two towers attached to the quadriporticus, as built by Constantine, but there are no means of proving this point.

In front of the quadriporticus, and leading up to the great gate, was a platform (fig. 5) approached by an immensely wide flight of white marble steps, subdivided into five sets, each consisting of seven steps—(fig. 6). Passing through the great gate and entering the quadriporticus, we should have found in the centre of the court-yard, the great Pigna or pine-cone from the mausoleum of Hadrian (fig. 7), preserved beneath an elaborate and beautiful Gothic baldacchino adorned with mosaic work, and a few yards nearer to the church another pine-cone of brass which spouted out water and formed a fountain for the refreshment of pilgrims visiting the church (fig. 8).

The great east front of the church itself, though preserving the outline of Constantine's church, had been covered with mosaics, and its windows filled with Gothic traceries in the fourteenth century. Grimaldi speaks of these windows as being arranged "more Germanico," but they appear to have resembled most Italian Gothic windows of that period. Like all the others in the church, they were divided into three lights, and had three cusped circles in the head.

The church consisted of a long and very wide nave with four aisles. The clearstory was supported by forty-six columns, twenty-three on either side. The transept was not arranged as in Gothic churches, but formed a transverse nave at right-angles to the principal one, so that there was no "crossing." The great apse or tribune opened from the west side of the transept by a large arch called "Arca Triumphalis." To the west of the great apse was the Lady-chapel, erected by Probus and Proba (Prefect of Rome, and his wife), in the sixth century. It really formed a complete little basilica, having its nave, aisle, apse, and campanile, as is shown by the long section of St. Peter's in Fontana's work (see F).

The old basilica of St. Peter was surrounded by chapels and churches. Referring to our key-sketch, at G was the pontifical entrance to St. Peter's, used by the Popes when they lived at the Lateran Palace, and beyond it, at H, was a building called the "secretarium," in which they robed. Some writers have reversed the order of things here, and have created a confusion which seems to have very much troubled Bonanni, inasmuch as it makes the Popes enter the basilica through a chapel without an external doorway to it, and robe themselves upon a public staircase! All along this side of the nave were a series of ancient chapels, but Sextus IV. destroyed all their symmetry and regularity by building what, from the view published in Bonanni, and made in the pontificate of Sextus V., must have been a remarkably ugly chapel (J) for the use of the canons of St. Peter.

Two very curious buildings will be seen at figs. K, L. They are similar in design, forming large rotundas. Fontana appears to think that one, or both, of these were Pagan temples, which stood upon the spina of the old circus of Nero. Ciampini, however, says that the further one, dedicated to St. Petronilla, was erected by Honorius I. According to Fontana, these temples were dedicated to Venus and Mars; and what certainly is a strong argument in favour of Fontana's view is the fact that they stood close to the situation of the old obelisk called "La Giulia" (see M), from its having been brought over by Julius Cæsar, which certainly was in its original position on the spina of the circus, before Fontana removed it to the front of the modern church.

The two rotundas, however, were dedicated under the titles of "St. Petronilla" and "Sta. Maria de Febribus." The former was pulled down before the time of Sextus V., but a very interesting view in Bonanni's work shows the latter as it appeared in the time of that Pontiff, when it came to be used as the sacristy of St. Peter's. Uniting these buildings was a chapel and altar dedicated to St. John Chrisostom, see N, within which that great doctor of the Church was buried. On the opposite side of the basilica, at O, stood the chapel of St. Gregory the Great, containing the tomb of that illustrious Pontiff, and beyond it was a complete basilica church, P, which belonged originally to a monastery called Jerusalem, but after the removal of that monastery was dedicated to St. Vincent, and I cannot help connecting this building with the Jerusalem Chamber at Westminster Abbey. Its position is identical, and its juxtaposition to the tomb of St. Gregory the Great, whom Venerable Bede calls the Apostle of England (see book 2, cap. 1), seems too remarkable to be a mere coincidence.

On the opposite side of a narrow street, on the south side of the Basilica, stood the Campo Santo (Q), with its church dedicated to "S. Salvator de Ossibus" (R), erected by Charlemagne. It had a lofty campanile, and is shown in Ciampini's plan as being very nearly square, standing north and south, and not east and west. It should here be noted that the Basilica of St. Peter itself was *exactly* orientated, but, of course, as in all the old Basilica churches, the Tribune and High Altar were at the west end, the latter having its back towards the congregation, so that when celebrating the priest and the congregation faced each other. So exactly due east and west was the Basilica that, on the vernal equinox, the great doors of the porch of the quadriporticus were thrown open at sunrise, and also the eastern doors of the church itself, and as the sun rose, its rays passed through the outer doors, then through the inner doors, and, penetrating straight through the nave, illuminated the High Altar.

On the right hand side of our view the old buildings of the Vatican are indicated, there is, however, considerable uncertainty about them. Nothing now remains of an earlier date than Nicholas V., except possibly the external walls of the Sistine Chapel, which look as if they might have formed a portion of a great hall or keep, which is shown in early views. Muratori says that Nicholas V. intended to rebuild the whole of the Vatican and St. Peter's. This statement seems to require corroboration, for, as we have previously noticed, his work at St. Peter's must be regarded rather in the light of a restoration than the commencement of a new building. The old Vatican was built, or re-built, by Innocent III. Bonanni, quoting from a manuscript life of Innocent III., says that "in 1200 he caused this house to be made anew, with chapel, chaplin's chambers, kitchen, stables, houses of the chancellors and chamberlains, elemosynarium, &c. He commenced the great hall (probably the building on the site of the Sistine Chapel), completed the loggia, enclosed the palace with walls and built the towers." It appears that Arnolpho di Lapo was one of the architects employed. In 1258 we find it stated that Nicholas III. ordered to be made the great hall, the palace, the chapel, and the ancient buildings to be enlarged. In all probability this hall was the one in the lower court of the Vatican, which is distinctly shown between the two great towers, one of which formed the "Orologium," or clock-tower. John XXIII. built the long gallery which connected the Vatican with the Castle of St. Angelo. It will be noticed at once that the Vatican and the Belvedere formed distinct buildings. It is to be regretted that the antiquarians and writers of the fifteenth and sixteenth centuries did not extend to the Vatican the same care which they exercised in preserving documents and drawings of the church and quadriporticus. As it is, anything like a careful restoration of the palace is impossible, as the views which show it are too vague to be implicitly relied on for such a purpose. As far as the palace itself is concerned, therefore, our restoration must be taken as being merely suggestive.

H. W. B.

NOTES.

FROM our correspondence columns it will be seen that our friend Mr. T. G. Jackson continues to hammer away at the Institute and its examinations, and now concludes with the charge that the Institute is not offering "to a too confiding public" any guarantee of the artistic competence of its members. We do not understand that the Institute ever professed to be able to accomplish such an object by an examination test. What it professes to be accomplishing, or aiming at, is, in the interests of architects, to direct the studies of students to a fixed end, and to raise the general standard of knowledge and education among its members; and in the interests of the public, to ensure that members of its body shall have a competent knowledge of the technique of architecture. That is all the public could demand from it, or could expect to obtain. The question of an architect's artistic power, it has been over and over again pointed out (by "the memorialists" themselves among others), cannot be decided by any infallible test, any more than in any other branch of art. Cultivated public opinion settles that in the long run, as in every other form of art. Membership of the Royal Academy, a purely artistic body, does not settle such a question in the eyes of the public. People who know enough to distinguish between good and bad sculpture or painting are not influenced in their purchases or commissions by the consideration whether the artist is or is not a member of the Royal Academy. They judge the artist on his own merits and the testimony of his known works. The same test of free public opinion would operate

equally in deciding the artistic status of an architect. The Institute is not proposing to say to the public, "all our members are men of artistic power;" nor does the public want its advice on that point, any more than it wants that of the Royal Academy. What it proposes is to be able eventually to say, "all our members are men well instructed in the history and technique of architecture, and are up to a certain standard in general education" (the latter not so unimportant a point as some people think). More than this it is impossible that it could accomplish, since there is no infallible test of artistic power. Mr. Jackson blames the Institute for not doing what, in the nature of things, it is impossible that it could do.

THE dreadful catastrophe at Gateshead can hardly come under the chapter of accidents; even the word "catastrophe," which we substituted for "accident," is hardly the expression called for. The deaths unhappily caused by the rush for the exit should really be returned under the heading, "Suicide while in a state of unsound mind," always excepting that of the unfortunate doorkeeper who was killed while doing his best to bring a set of panic-stricken people to reason. It is with a melancholy sense of the hopelessness of average human nature that one has to read once more the discreditable story of hundreds of people losing all courage and presence of mind, and killing each other in a panic flight, because one hysterical woman screamed out "Fire!" The hysterical person, who is usually an element in these cases, has much to answer for, and has not always the excuse of feminine nervousness; and if the next person who started the cry of "Fire"! in such a case could be caught and given a year's imprisonment, perhaps other silly people would think twice before trying to upset the nerves of others on an occasion when coolness is the first requisite. In regard to the exit question it does not appear this has much to do with the matter when people once give way to a panic. The practice of keeping one leaf of the door closed after the house is full is very reprehensible, and may give rise to danger, or at least delay in exit, even when there is no panic; but it does not appear that it would have made any difference in this case if the doors had both been open. The real point in the matter, however, lies in the evidence the event gives of the danger and impropriety of wooden construction in theatres, with hollow spaces where inflammable matter can lodge. Had the gallery been built of iron and concrete, with solid steps, there would have been no crevices in which papers could get lodged and into which matches could be let drop, and the hysterical person would have no temptation to begin his or her death-song. That is the moral of the whole thing from a constructor's point of view. Build the whole gallery of iron and concrete, and set wooden benches, if there are any, on solid steps, and the material for a fire-panic is reduced to a minimum, if not entirely removed. Here the whole material was, as it were, carefully prepared, and only required the match and the hysterical person to set it going.

THE three premiated designs for the proposed new parochial offices at Battersea have been for the past week on view at the new Free Library, Lavender-hill. Considering that this was a "limited" competition, we think it desirable that all the designs sent in should have been exhibited, and not only those awarded the premiums. Ample space was available in the room in which the drawings are hung for a selection at least of the other designs, and such a course would have been distinctly fairer to the other competitors, and would have allowed the general public to form an independent idea of the merits of the several designs submitted. The design sent in by Mr. Mountford, which was placed first, we have already noticed and illustrated (*Builder*, December 19, 1891). Of the various ways which were open to competitors in the arrangement of the blocks (the details as to the arrangement of the various offices having been clearly defined in the conditions) two naturally presented themselves,—either of separating the public hall block from the official block, or combining them in one. Mr. Mountford has chosen the latter, which has the merit of giving communication between them by means of corridors without going into the open air, and is also the more economical of the two arrangements. The fall in the site was considerable at the northern end, and this has enabled Mr. Mountford to place the two smaller halls, which were required by the conditions, below the Public Hall. The Council Chamber is placed centrally, facing Lavender-hill, on the first floor, and the Coroner's Court is on the same floor at the back of the official block, and approached by a separate staircase, as shown on the ground-plan. The angle formed at the junction of the two blocks has been cleverly masked by the introduction of an octagonal vestibule to the public-hall, covered with a glass dome, with the reception-room and lavatories leading directly from it. The design by Mr. Cheers is somewhat unaccountable in its arrangement. On a site which was, compared with many, of a simple character, there is no obvious reason that we can see for the complicated arrangement of the various offices. The first thing that occurred to us on looking at the plans was that it would be apparently very easy to get into the building, and very difficult to get out. The central portion of the façade, which naturally suggested the position for a Council Chamber, has been unnecessarily frittered away in staircase and vestibules, and the Council Chamber finds a resting-place at the extreme rear of the building, where the quiet,—when it was reached,—would be its only recommendation. A large public hall, over 100 ft. in length, occupies the major portion of one side of the front block, although it does not appear on the front elevation. In short, this design is one of those unhappy instances of an exterior which gives no key as to its internal arrangement, and wants that element of simplicity and directness which should be characteristic of a good plan. Messrs. Reed & Macdonald, who were placed third, have adopted the "separate block" system, and the official block has a carriageway completely surrounding it. The arrangement of the various offices is good. The Council Chamber and Coroner's Court are on the first floor, as in the design submitted by Mr. Mountford. The elevation to Lavender-hill is somewhat tame, and is not improved by the perspective view, which gives an even less satisfactory result than the elevation would lead one to expect.

THE resignation of Lord Lingen and Mr. Cohen of their positions on the Financial Committee of the London County Council has had one good effect, at any rate: it has drawn public attention to the principles of municipal loans. There are two clearly-defined parties in the Council on this point. The one to which Lord Lingen and all clear-headed men of business belong desires to see loans paid off in such a manner that the amount payable each year becomes less and less. The other party, headed by Mr. Charles Harrison, desires to see loans paid off on what is called the annuity principle, by which the amount of principal and interest to be repaid will be the same in the last as in the first year of the debt. It is clear that the first-named is the proper principle, otherwise—as it is certain that fresh improvements will necessitate fresh loans,—in a certain number of years the municipal debt must be largely increased. But when the amount payable diminishes year by year, if fresh loans are required, they can be procured without increasing the burden on the community. Moreover, each generation should, so far as possible, pay for its own work, even if the work should be a benefit to posterity. It is not possible, of course, for a community to pay for extensive operations out of the revenue of a few years. But that is no reason why they should not pay off as much of the money borrowed during present times as is possible. Any other system of finance is both unsound and wanting in courage.

THE Bill which is brought forward by the Corporation of Birmingham for the purpose of obtaining a new water supply from the mountains of Wales is hardly likely to meet with any serious opposition. The principle that large towns are entitled to go to some distant district for the water supply has already been sanctioned in the case of Manchester and Liverpool. Hence the only questions to be set up relate to matters of detail. It has been supposed that a new Standing Order of the House of Commons may entitle the London County Council to oppose this Bill, on the ground that London may some day wish to obtain a supply from the same source. But it is doubtful if the Standing Order in question applies to such a case as this; even if it does give the London County Council a *locus standi*, it is equally clear that a possible, but uncertain, scheme for the supply of London from the mountains of Cardigan, Radnor, and Brecknock cannot be any real ground for refusing the demands of Birmingham. There is a legal and sensible maxim that the first in point of time is the first in point of right, and this principle clearly applies to such a case as this. The amount of the cost of the work, between six and seven millions, is very large, but it is an undertaking which, if successfully carried out, will supply Birmingham with water for generations, and it is well that such a work should, if done at all, be done thoroughly.

THE recent fogs have again drawn public attention to the way in which time, money, and health are lost in consequence of them. There was a time when they hardly caused inconvenience: the growth of London has increased their density and their injurious effects. In truth, they are the modern plague of London. It is annoying that no attempt has yet been made to obtain an authoritative and trustworthy report as to the means for their prevention. A Royal Commission, composed of scientific and practical men, might make a report, which might in its turn lead to beneficial legislation. These winter fogs have now become so great a pest that it is certain they will cause large numbers of persons who are not bound to the metropolis by business ties to leave it in the winter, and will prevent many from coming to London who would otherwise do so. The Metropolitan Members of Parliament should take the matter in hand: they are strong enough to force the matter on the attention of the Government, which, indeed, should not require much pressure to order an investigation into this affliction of the metropolis.

WE have received several samples of polished stone of grey, green, and red tints, and called "Bavarian granites," which the senders are desirous of more fully introducing to the English market. Now, we have nothing much to say against the materials, so far as their utility is concerned, but we do object to having them sent to us as coming from Bavaria, when we find that, as a matter of fact, some come from Sweden, and others from Saxony. Six of the specimens sent are unquestionably of Bavarian origin, and are quarried in the neighbourhood of Bayreuth; these are grey, with the exception of one which is greenish in tint. The Swedish and Saxon samples are of rich red and deep green colours, and when these are interspersed with the true Bavarian stones they decidedly heighten the tone of the whole. A beautiful pink granite was also included amongst the samples, but in answer to an inquiry we find that this "has been withdrawn, as there is very great difficulty in getting any quantity of it." Why, then, was it sent to us? The real Bavarian

granites, although of grey tints and not so showy, perhaps, as the remaining specimens, required no bolstering up. They are amongst the best granites we have ever seen; with one exception they are of warm tints, and will doubtless find a ready sale on that account. The nature of the minerals of which they are constituted, no less than the general structure of the stones, and their fine grain, place them at once above the average granites in point of durability. The greenish variety contains rather more iron pyrites than we like to see in a really first-class weather stone, and magnetite is found in small quantities in the more basic kinds, but these deleterious accessory features are more than compensated for by the fine condition of the essential minerals concerned, and do not materially detract from the value of the granites as a whole. The deep red stone from Sweden, which takes a good polish, is coarse-grained, its general tint resulting from the colour of the orthoclase felspar; the quartz is beautifully opalescent, and a dark mineral, resembling hornblende, is abundant. The dark green stone, apparently from Warberg, in Sweden, although handsome, contains such a large proportion of iron that we do not consider it would weather very well. It is not a stranger to the British market; we have seen it commonly in the yards of certain Aberdeen granite merchants. In the red granite from Saxony, alluded to, the orthoclase is pink, and the more or less rounded crystals of quartz which are "smoky" produce an effect much resembling our famous Peterhead granite. All these stones, from their nature and appearance, are eligible for competition in this country, and they will doubtless become conspicuous features in the market.

AT an adjourned meeting on Wednesday, the 23rd ult., the London County Council agreed (as reported in another column) to offer 5,000*l.* for the "Poor's Land," Bethnal-green, in pursuance of a clause in the Charity Commissioners' scheme of February last year:—

"The trustees shall, with the approval of the Charity Commissioners, and upon terms such as to secure a sufficient benefit to the poor of the parish of St. Matthew, Bethnal-green, forthwith grant to the London County Council, or any other public body, all the land held in trust for the charity, provided that the said land be secured and permanently maintained . . . . as a recreation-ground accessible to the inhabitants of the said parish."

This area of about six and a quarter acres is all that now remains of the fifteen acres, waste land of the manor, as conveyed under a deed of 1690 to "trustees for the poor" by certain persons who had bought the land and enclosed the greater part of it "for the prevention of any new buildings thereon, and to be for the yearly relief of the poor," &c. The trustees are empowered to lease the lands for terms of twenty-one years at the longest. Under special Acts they were paid 3,000*l.* Consols for sites for St. John's Church and vicarage, and the Museum, opened in 1872, with its adjoining pleasure-ground.* A lease of the remainder to Bethnal House (private lunatic) Asylum, for purposes of a garden, expired at Michaelmas, 1889. The Commissioners drafted three schemes,—one to carry into effect proposals by a majority of the twelve trustees for selling three plots of the vacant land for about 19,500*l.*, to provide sites for a free library, an infirmary, and a new Vestry Hall, with conversion of 2½ acres into an open space. Those projects were opposed by, *inter alios*, the Metropolitan Public Gardens Association. The ultimate scheme was recently petitioned against,—in respect of its clause 30, quoted above,—by a majority of the trustees. They urged that whilst the deed of 1690 had, admittedly, two objects,—provision for the poor, and keeping the land open,—the latter is subordinate to the former, or eleemosynary, trust; and that such a sale would debar them from obtaining a full price for the ground. On July 23 Mr. Justice Chitty gave judgment in court in favour of the scheme, and declined to allow the petitioners' costs as out of the trust. His lordship is reported to have said that, looking to the deed, the contested clause formed, in his opinion, a lawful and *cy pres* appropriation of the property, for the deed, besides setting up a charity, had declared the land was to be kept open. Thus, we gather, a long out-standing question will now, in all likelihood, be determined.

* Opened by the Office of Works in 1876. To it was added the Green, on the east side of which stood "Blind Beggars' House," built in 1570, it is said, by John Thorpe, the architect, for one John Kirby.

ALL Saints' Church, Hertford, which, as we read, was entirely destroyed by fire last week, stands within a large graveyard in Fore-street, on the south side of the borough. As rebuilt, mainly of flint and chalk overlaid with rough-cast, early in the fifteenth century, it consisted of nave, chancel, transepts, and western tower. Two aisles were added since, and a leaden-covered spire. The interior was decorated, re-pewed, and repaired in 1872-3. This is one of two churches held, together with a house, by Peter de Valoignes, castellan of Hertford, *temp.* the Conqueror,* and assigned by Peter's son, Robert, to the canons at Waltham "for the health of himself and Hawise, his wife." The monks enjoyed this grant, confirmed by Richard I., until 26 Hen. VIII. when the Crown took the vicarage advowson, then rated, together with that of St. John, at 10*l.* 6s. 8½d. per annum. We gather that the organ (1750) and the fine peal of bells are destroyed. The bells were originally five in number. In 1674 William Wake cast the great bell into four smaller bells; the eight were recast 1771, by Pack & Chapman, at the cost of the Society of College Youths, Hertford, who, twenty years later, added two trebles, cast by Bryant, a townsman,—making ten in all. Here were many monuments and memorials of certain county families, including those of Dimsdale, Harrison, Townshend, Battell, Cherry, &c., with inscribed brasses to Isabel de Newmarch, maid-of-honour to Richard II.'s consort Isabella; William Wake, "somtym yeman of John Duc of Bedford's hors, And lat Survayor with King Henry Sixt he was;" and John Prest, "quondam Janitor Hospitii Katharinæ nuper Reginæ Angliæ," —Henry V.'s queen. The registers are saved: an entry,—

"1666, Nov. 17th, Sir Richard Fanshawe, Lord Im Bassador, was laid in the Vault in the Chansell."

cited in Turnor's "History of Hertford," shows Colley Cibber correctly says that Fanshawe, our Ambassador to Madrid, where he died, was buried in this church. A subsequent entry stands thus:—

"1671, May 18, Sir Richard Fanshawe, Imbassador, was taken out of this Vault, and laid in his Vault at Ware."

A tombstone in the burial-ground recorded the interment of "Black Tom" of the Bull Inn, Bishopsgate-street, in 1696. A view of All Saints', by J. & H. S. Storer, will be found in Lewis Turnor's volume.

* For account of Hertford Castle see the *Builder*, December 23, 1882.

AN interesting lecture on "The Development of the Pig-iron Manufacture in the United States" has been lately delivered before the Franklin Institute by Mr. John Birkinbine, and now appears in the *Journal* of the Society for last month. In 1866, the United States only produced as much pig-iron as Great Britain did in 1835, so that she was then thirty-one years behind this country. At the end of 1884, however, she was only twenty-one years behind, and if the same rate of progress of both countries continues, she will produce as much pig-iron as England in 1950. In the United States between 1830 and 1860, the production of iron increased twice as fast as the population, and between 1860 and 1890 it has increased four times as rapidly, the consumption at the present day being at the rate of about 300 lbs. per head, the whole of which is produced in the country. Great Britain, on the other hand, makes more than she consumes, and during 1889 the production reached nearly 500 lbs. per head. As at present the production for the whole world is about 25,000,000 tons per annum, and during the next ten years this supply must be increased by at least 50 per cent., there is a bright future for those engaged in the manufacture of pig-iron and the allied industries.

THE same journal contains a paper on "Fuel Gas," by Mr. Arthur Kitson, in which he describes its production and distribution. The great value of gas for metallurgical work became evident directly Siemens introduced his regenerative furnace. The distinction that is made between fuel gas and illuminating gas arises chiefly from the difference in cost, since the latter makes excellent fuel gas providing it can be sold at a price sufficiently low to allow it being used for the purpose. Since it is possible to obtain about one-half of the total heat of combustion of gas, while only one-sixth of the heat contained in coal can be made serviceable for ordinary domestic purposes, the fact that gas generated from coal contains less energy than the coal itself does not prevent fuel-gas being economical. The author draws attention in his lecture to various methods of making the gas, and describes a producer he has designed, besides giving the results of several experiments he has carried out in connexion with this subject.

IT is extraordinary what vitality a scientific blunder possesses. More than twenty years ago Professor Tait, speaking before the British Association, said:—"Mark, however, that heat is not the mere motions, but the energy of these motions—a very different thing, for heat and kinetic energy in general are no more '*modes of motion*' than potential energy of every kind (including that of unfired gunpowder) is a '*mode of rest*.' In fact, a '*mode of motion*' is, if the word motion be used in its ordinary sense, purely kinematical, not physical,—and, if motion be used in Newton's sense, it refers to momentum, not to energy." This emphatic protest ought to have killed the expression long ago, yet only the other day, not in a popular work, but in a singularly able leading article in the *Electrician*, on the question of the existence of electricity, we came upon the statement that heat is a "mode of motion." This strange persistence of error makes it very important to protest early against any abuse of scientific phrases. Already in three glossaries of electrical terms, we have found the "watt" defined as the unit of electrical energy, and a writer in *Lightning* who made, by implication, the same statement, while acknowledging the error, defends it, as "what in common parlance is done among engineers on every day in the week." If this be so, so much the worse for the engineers; they are preparing trouble for themselves in the future. What is the use of giving special names to definite scientific conceptions, if these names are to be regarded as interchangeable at will?

THE cable industry was threatened with extinction lately from the scarcity of india-rubber. Fortunately a large number of these valuable trees have been discovered in New Guinea, whence they can be transplanted and cultivated in more accessible portions of the globe. We shall, therefore, continue to receive from America early news of depressions, atmospheric and mercantile, and of the sayings and doings of that erratic genius, Mr. Edison.

WE have received a large quarto illustrated pamphlet got up by Mr. Franklin W. Smith, a wealthy inhabitant of Boston (with the help of Messrs. Renwick, Aspinwall, &

Russell, architects, of New York) containing the general idea for a great National Gallery of History and Art for America, proposed to be erected on the banks of the Potomac at Washington. The object of the publication is to arouse the public mind in America on the subject, and certainly the scheme proposed by Mr. Smith is magnificent enough to satisfy even a country which always wants to do something bigger than all the rest of the world has done. The idea apparently is that all the leading styles of architecture of the world are to be reproduced in the several halls and galleries; the domain is to be entered by a bridge over a small lake flanked by circular colonnades, and the climax reached at the further side in a kind of modern Acropolis with an imitation Parthenon (to a larger scale) surrounded by great double colonnades. The galleries, we presume, are to be filled with works of art of various types. We should very much doubt so ambitious a scheme being carried out, and fear it would look rather like an enormous museum of curiosities. If the American nation wish to have a National Gallery of Art, they will do more wisely to content themselves with attempting a more reasonable building in a modern style.

WE note the appearance of the third part of Mr. Gotch's work on the "Architecture of the Renaissance in England,"* which includes illustrations and description of Kirby Hall, well known as one of the most interesting buildings of its class. The first two "Parts" of the book we have already noticed at some length. When the whole six "Parts" have been issued we will devote further space to a consideration of the remainder of the work.

IN the matter of the London Building Act Consolidation Bill, the Building Act Committee of the London County Council have suggested a number of amendments, and the Institute of Architects have issued suggestions for a "Draft Bill for the codification and amendment of the Metropolitan Building Acts," printing in double column the existing clauses with the proposed amendments and amplifications opposite. These we shall give full consideration to on another occasion.

THE *Daily News* says that in making the subway between the Great Northern Railway terminus and the King's Cross (Metropolitan) station, the men have found a solid block of concrete several yards square, 2 ft. under the centre of the roadway, a few feet north of the Metropolitan tunnel. Our contemporary goes on to say:

"According to old plans, it is the foundation of the cross erected in 1290, by order of Edward I., as one of the resting-places of the body of Queen Eleanor, on its way from Hornby, in Lincoln (*sic*) where she died, to Westminster Abbey."

We have not seen the old plans referred to; and, at present, are inclined to suspect that, in view of the block's situation, and shallow depth beneath the present surface, it formed rather a foundation for the ridiculous structure, of brick cemented over, consisting of a watch-house (with a pair of Doric-fluted columns at each angle) and clock-tower, surmounted with George IV.'s statue, by Stephen Geary, architect, which was erected on the site (as we have read) of Cromwell's observatory at Battle-bridge sixty years ago. They took down the statue in 1842; the watch-house and tower, having served as a police-station, and then as a tavern with a camera-obscura in the tower, remained until 1845.† Crosses were set up in London to the Queen's memory at Charing-cross, where Charles I.'s statue now stands, and in Cheapside, by the end of Milk-street (or Wood-street). Of the latter there are views in Wilkinson's "Londina," after the Cowdray painting of Edward VI.'s coronation procession, and an original drawing (1606) in the Pepysian Library, at Magdalene College, Cambridge, &c.

* Published by B. T. Batsford.

† *Vide* prints (1830) of the statue, and woodcuts (1842) of its removal, in the Guildhall Library, and the Crace Collection, British Museum; also Pugin's "Contrasts."

THE following paragraph, which appears in the *Times* of Tuesday last, ought to do something to further the movement in favour of an improved source of water supply for London:—

"POLLUTION OF THE THAMES.—At Staines Petty Sessions, yesterday, George and Robert Morgan and William Haimer were summoned by the Thames Conservancy for having emptied the contents of a cesspool into the Thames just above the intakes of the metropolitan water companies. The case was clearly proved by a Conservancy official, and the defendants were fined 50s. each."

We wonder how many cases of this kind escape undetected? The dangers to which London is thus exposed have often been pointed out, and it is appalling to think of the possible consequences in the event of the prevalence of typhoid fever in Staines or other places above it.

FROM a letter of the Rector of St. Mary Woolnoth, in the *Times* of December 26, giving some of the results of Mr. Mark H. Judge's examination into the condition of the building, it seems evident that it is nothing short of a public duty, independently of any consideration of the use of the church by the congregation, to remove from the centre of the city the festering mass of human remains which is enclosed in the basement of the church. That this may be done without permanent injury to Hawksmoor's remarkable building we have no doubt, and we hope we shall hear no more talk of anything so absurd as destroying the church.

IN reviewing a book on American railways some time ago we spoke strongly as to evidence given in it as to the deplorable want of the feeling of responsibility for the public safety, both in the construction of railways and in the performance of duty by officials, which was admitted in a book written by American engineers and railway officials. According to the New York correspondent of the *Times* (December 25) a crucial instance of this criminal light-heartedness on the part of American railway officials was given in the case of the collision between two trains on the New York Central Railway:—

"It is alleged that the brakesman who was sent to stop the St. Louis express reached Hastings Station in ample time to stop the train, but, believing it not to be due for some minutes, he stopped to take a drink with the stationmaster, and while so engaged the express dashed past."

Englishmen who are interested in railway working may be allowed to feel some pride in the reflection that such a deliberate dereliction of duty would be impossible and unheard-of among the humblest officials of a great English railroad.

LETTER FROM PARIS.

SINCE our last letter the question of the Sèvres manufactory has been definitely settled. The Minister of Public Instruction, much embarrassed by the refusal of M. Bracquemond to undertake the directorship, took the advice of the Conseil Supérieur des Beaux-Arts, which has decided a division of power between three distinct sections. The "administration" section will be placed under M. Baumgart, who will be responsible for the working of the manufactory. The section of "Travaux Techniques" will be placed under a distinguished chemist, M. Vogt; and that of "Travaux d'Art" under M. Jules Coutan, the sculptor of the monumental fountain of the great Exhibition.

M. Coutan's talent is well known; he is a conscientious artist in his own work, with a fine eye for form, but nothing in his past career seems to point him out specially for such a post as that at Sèvres. Ceramic art requires a special knowledge and experience, and a director of design in that art should have also knowledge of the practical processes employed; in fact there is or should be a close connexion between "travaux d'art and travaux techniques" in this class of work. The future will show whether the young sculptor will be able to put any new life into the now rather superannuated form of work put forth, not much to the national credit, from the Sèvres manufactory.

The Minister is also bent on transforming and developing the "Ecole de Sèvres." This institution is organised for giving instruction in ceramics for the benefit of private industry. Henceforward every citizen furnished with an official authorisation can obtain all the instruction he requires in design and manufacture; and funds are reserved for making all researches in regard to the fabrication and design of ceramic work. In short, the Sèvres institution will now be at once an artistic establishment, a centre of scientific research, and a school of advanced study in ceramic art. Such at all events, is the intention of the Minister of Fine Arts. It remains to be seen whether or not the good results anticipated will be realised under the routine system which always clings about a State establishment.

We have referred already to the projected "museum fund," to be furnished by the proceeds of payment on entry, a measure certain to be exceedingly unpopular. Such has been the opinion of the Budget Committee, which has pronounced itself strongly in favour of retaining the present free entry to National Museums. The Committee is, however, in favour of the increase of the annual credit for museums and art galleries, in order to facilitate the purchase of pictures and works of art. The authorised expenditure will probably be raised from 200,000 to 500,000 francs, and this is certainly the best solution of the difficulty, and there is little doubt that Parliament will ratify the proposal.

A good deal has been said in the press about a provincial shop for the manufactory of spurious Millet pictures, said to have been concocted by a former pupil of the artist. The fraud has been carried on for some time, it appears with profitable results. The police have put an end to an enterprise, which at all events showed that the "facture" of the celebrated painter of the "Angelus" was not difficult to imitate, and that the artistic perception of the majority of purchasers leaves great room for improvement.

Fraud however is very rife at present in connexion with artistic work; not only the fabrication of spurious works of art, but of the whole materials with which they are produced, such as pigments, oils, varnishes, &c. A number of painters, all members of the Institut, have felt this so strongly that they have addressed a memorandum to the Prefect of Police praying that all materials of painting offered for sale should be examined at the municipal laboratory and officially stamped.

We are in the season of small private exhibitions. To the usual number is this year added an exhibition with the pompous title of the "Exposition des Peintres Symbolistes." Under this title, perhaps destined to efface that of "Impressionist," are grouped a few young artists of talent, nearly lost in a crowd of mediocrities. Among those whose talents have been long recognised are M. Renoir, with a fine pastel; M. Willette, who has three exceedingly delicate drawings; and M. Lepère with an important landscape. Among those who promise well are MM. Bonnard, Maurice Jenis, Anquetin, Filliger, de Toulouse, Lautrec and Seruzier.

The exhibition organised by M. Antocolski, a Russian sculptor, is also noticeable. He has a great reputation in his own country, and his score or so of statues exhibited enable one to appreciate his merits, but he shows a certain "preciosity" in the handling of the marble which is too much of the modern Italian school, and fatigues one by the *finesse* and multiplicity of detail. This pitfall at least modern French sculpture has avoided, and the exhibition of terra-cottas by the lamented Carrier-Belleuse which is now open forms a notable contrast in this respect with the work of the Russian sculptor.

It may be mentioned here that there is shortly to be an exhibition of the works of the late landscape painter Pelouse, as well as the ninth international exhibition of "Blanc et Noir," which will this year be transferred to the Champ de Mars, and will comprise an important retrospective exhibition of engraving to which many well-known collectors have promised to contribute.

The exhibition of photographs collected by the Commission des Monuments Historiques, at the Trocadéro, should not be overlooked. There may be seen photographs of many of the most curious ancient churches in France: St. Oustrille, Ruan, Uzerche, St. Calais, &c. This fine collection, organised by M. Mieusement, shows the visitor also the Druidic monuments, dolmens, and meuliers, scattered about the districts of Charente, Maine-et-Loire, la Sarthe, and Brittany.

From historic monuments to "bâtiments civils" the transition is easy, since both are under the same administration, and it may be here mentioned that M. Yves Guyot has reconstituted the bureau of "bâtiments civils," which for 1892 will be thus composed: M. Jules Comte, President; MM. Charles Garnier, Daumet, Pascal, Moyaux, Bouvard, Marcel Lambert, Paulin, Vaudremer, Sédille and Blondel.

It is announced that the Direction des Musées Nationaux has decided to put at the disposition of the public plans of large dimensions and variously tinted, to be hung at the two principal entrances of the Louvre, to enable visitors to find their way round without a guide; an excellent innovation, since to strangers the Louvre is a complete labyrinth of which it is difficult to find the clue. The Louvre has just acquired a curious bronze statuette of Dionysos, attributed to Praxiteles, and long reputed among archæologists as one of the finest productions of that period of Greek art. It has also acquired five polychromatic stucco statues of the Italian school of the fifteenth century.

The State Committee of Fine Arts has recently examined the new model executed by M. Rodin for the monument to Victor Hugo in the Pantheon. In the first design, which was refused, the three figures symbolising the inspiring voices of the poet were placed above his head. In the second, the figure of Victor Hugo himself dominates the group. The new design is considered very satisfactory and M. Rodin is commissioned to commence the work.

Since December 25 the public has been admitted to examine the ninety-six designs, at the Champ de Mars, for the decoration of the Salle des Banquets at the Hôtel de Ville. The first selection will not be made till January 5 or 6, and the jury will have some difficulty, from among these ninety-six, in selecting the five who are to be worthy of entering for the final competition. The spaces for the decoration are three large ceilings and eight door-heads. The sum to be allowed is 49,000 francs, and the Committee charged with the work have set themselves against the eternal "still-life" subjects which form the recognised decoration of dining-halls. Some of the painters have endeavoured to combine the figure with these materials of decoration, by paintings of fish-shops, fruiterers, &c.; but the result is not happy. Others have struck the patriotic chord, and one represents on the ceiling the fraternising of French and Russian sailors at Cronstadt! In spite of some pretentious or absurd work, however, the competition as a whole is up to a high standard.

The Académie des Beaux-Arts will be shortly occupied in filling the place of M. Alphand. M. Philippe Gille is said to be a candidate. He is a well-known journalist and dramatic author. His candidature can hardly be considered serious, yet it is more comprehensible than that of M. Roger Ballu, who is said to have already commenced the customary round of visits; but he is too young a man and with too little artistic achievement to show, to have any chance of entering an institution of which every member is a celebrity.

The Académie des Beaux-Arts will also have shortly to elect two foreign corresponding members in place of MM. Rosa and Vela. M. Fioreli is a candidate "en première ligne," Mr. Alma Tadema "en seconde ligne;" MM. Hasenauer, Jacobi, and Cuypers are also spoken of.

Public works in Paris offer little of interest at this time of year. We may mention the formation of a new abattoir on the left bank, similar to that of la Villette; and the works necessary for the isolation of the Sainte Chapelle. It is said that the Musée Galliera will soon be inaugurated. We shall have occasion to speak further of this elegant edifice, designed by M. Ginain at the cost of the widow of the Duc de Galliera, and the porticoes of which are adorned with sculpture by MM. Chapu, Thomas, and Cavelier. The art collection of the city of Paris will be infinitely better here than in the Musée d'Auteuil, built hurriedly in an out-of-the-way quarter, and which is, in fact, no more than a store-room, almost unknown to the Parisian public.

The general meeting of the "Société des Artistes Français" was held a few days ago. It appears from the results of the meeting that in spite of the schism which led to the establishment of the rival Salon, the financial condition of the Society is most prosperous; it proposes to spend a portion of its funds in creating a "maison de retraite" for impoverished artists, and has already collected and set aside for this purpose a capital of 113,000 francs; and it will be able in the course of this year to distribute more than 22,000 francs in giving relief to artists or their families. It may be said therefore that the future prospects of the "Société des Artistes Français" are exceedingly satisfactory.

THE ENGLISH IRON TRADE IN 1891.

IT would be vain to deny that 1891 has been a disappointing year to the iron trade. Prospects at its opening were not such as to give rise to sanguine expectations, but they warranted the hope that the coming year would be a fairly favourable one. This, however, has not been the case. The financial troubles towards the close of 1890, further disturbances in our trade relations with South America, the full effects of the tariff changes made in the United States, and a heavy falling-off in the shipments to the colonies, all tended to check our export trade. If it had not been for the comparatively sound character of our home business, the loss experienced by the English iron industry would have been still more severe than it actually has been. Taking things as we find them, and looking at facts broadly, we are confronted by a decline in our export trade such as it has not often been our duty to chronicle.

It will be fully a fortnight yet, from the time of writing, before we shall have the complete returns of our export trade; but the results of the first eleven months of 1891 form a safe indicator what the total deficiency in the year's exports will be. We shipped in the first eleven months of the year now closing 3,018,026 tons of iron and steel, of a total value of 25,007,291*l.*, against 3,738,020 tons, valued at 29,313,214*l.*, in the corresponding period of 1890. The loss was consequently 719,994 tons, or over 19 per cent., in quantity, and 4,305,923*l.*, or 14·7 per cent., in value. Although the decrease is emphatic, it is, nevertheless, a source of comparative satisfaction that the decline in tonnage and value shows no great difference, an indicating that prices have not deteriorated greatly in the year, as will be seen further on. To this loss in iron and steel must be added a falling-off of nearly 9 per cent. in hardware and cutlery, of over 2 per cent. in implements and tools, and of 3·2 per cent. in machinery and mill-work. Unsatisfactory as this may appear, it is somewhat of a consolation to know that it might have been worse, considering all the conditions of business in 1891.

As in the case of our foreign trade, we shall have to wait some time yet before we learn the extent of our production of iron and steel in 1891. The estimated output of pig-iron in the north of England during the year is, in round numbers, 2,630,000 tons, against 2,846,089 tons in 1890, and from this preliminary statement of the production of the chief pig-iron making district in the country, some idea may be formed of what the total decline in the output of 1891 may be, bearing in mind the fact that the production of 1890 was the largest on record. It is an illustration of the changed conditions of the pig-iron trade that the price of Cleveland iron is no longer governed by that of Scotch pig-iron warrants. This is a healthy sign, and due to the fact that the pernicious speculation in Scotch warrants has been put a stop to by their successful "cornering" by what is known in the trade as the London syndicate, which body succeeded, in the course of the year, in getting hold of nearly the whole of the pig-iron warrants, the gambling in which has hitherto had such a baneful effect upon legitimate trade. What the ulterior objects of the syndicate may be is a matter of very little interest; but the good it has done is evident. The cash price of Scotch warrants at the beginning of 1891 was 46s. 2½d., at a time when the strike of the blast furnacemen in Scotland had not yet collapsed, as it subsequently did. The London syndicate managed, owing to the strike and the large purchases it was steadily making, to force up the price in January to 48s. 1½d. It continued manipulating the market, to suit its own ends, throughout the year, the price falling to 42s. 10d. by the end of March, but rising gradually until 59s. was reached on June 1. Since then, the syndicate having obtained all the iron wanted,—that is to say, nearly the whole of the pig-iron warrants in existence,—the price has steadily gone down, and at the close of the year it stands at 47s. 11d., or 1s. 9d. better than at its beginning.

Cleveland pig-iron stood in January at 42s. 6d. per ton, and December finds it at 38s., which shows the decline on the year to have been 4s. 6d. per ton. The comparatively high price of Scotch pig-iron caused large shipments of Cleveland iron to be made to Scotland, the increase in 1891 amounting to over 160,000 tons, counterbalanced to some extent by decreased exports to the Continent, but leaving the year's shipments of Cleveland pig still about 80,000 tons above those of 1890. This fact, no doubt, contributed to the comparative steadiness of Cleveland pig-iron, notwithstanding a reduced consumption. The price of pig-iron in Lancashire has also been comparatively steady, although the tendency, owing to a lessened demand, has been downwards, the decline being about 2s. 6d. per ton, from 48s. 6d. to 49s. 6d. to 46s. to 47s. for Lancashire iron. What are known as district brands have been sold in Lancashire at reductions ranging from 1s. to to 1s. 6d. per ton. Of all the pig-iron-making districts, Staffordshire has been the most favourably placed during the year. Cold-blast pig-iron was in January quoted 100s. per ton; it went up to 105s., but now stands again at 100s. Hot-air iron fell from 65s. to 62s. 6d., but is now again 65s. Partmine pig has risen from 42s. 6d. to 50s., and common iron from 37s. 6d. to 40s. As the consumption in Staffordshire has been nearly throughout the year in excess of the output, this explains the firmness which prevailed. The hematite pig-iron trade has not been very active, and everywhere a decline on the year's prices has been reported. In the north-west of England mixed numbers of Bessemer pig were quoted by makers 54s. 6d.; they are now 49s. On the east coast hematites fetched 55s. in January, and 48s. in December. In Lancashire, good foundry hematites were at the beginning of the year at 64s., and at present 57s. is the price. It only remains to add that Scotch makers, owing to the strike, sold very little pig during the first four months of the year, but, even after the furnaces were in blast again, there was only a very quiet business doing, and the result has been a decline ranging from 2s. to 9s. per ton, according to brand.

The fortunes of the finished iron trade have varied greatly during the year and in the several districts. In the north of England, although pretty well engaged, makers have had to submit to reductions averaging 9s. per ton on the year. Scotch producers of manufactured iron were, during the first part of the year, employed badly, but they are now doing better, without any really good prospects, however. They had to reduce their prices for bars from 6*l.* 7s. 6d. to 6*l.* 5s., and subsequently two other reductions, each of 5s. a ton, had to be made. Later on, however, the price rose to 5*l.* 17s. 6d., at which it now stands. Finished iron makers in Lancashire were in about the same position as those of Scotland. The year opened dull with them, with bars at 6*l.* 2s. 6d. to 6*l.* 5s., hoops at 6*l.* 7s. 6d. to 6*l.* 10s., and sheets at 7*l.* 10s. to 7*l* 15s. The close of the year finds bars at 6*l.* to 6*l.* 2s. 6d., hoops at the opening rates, and sheets at 7*l.* 7s. 6d. to 7*l.* 10s. The tinplate trade is now in a worse position than it was twelve months ago. The effects of the McKinley tariff did not make themselves felt until after June 30, but since that date the monthly exports have fallen to about one-half. The result has been stagnation in the industry, and a drop of about 4s. per box. Manufacturers of finished hardwares have not had much cause to complain. Their business was necessarily somewhat affected by the adverse conditions ruling in other branches of the iron trade, but there has never been any actual depression with them, and their prospects are better than they were a year ago.

The steel trade has not been nearly so well employed during the past year as in the two preceding ones, and wherever we look, we find a reduction of output and a lowering of prices. The production of steel ingots during the first six months of 1891 was over 100,000 tons less

than in the corresponding half-year of 1890, and this fact will explain the drooping tendency of the market. Those who suffered most were the railmakers; manufacturers of steel supplying shipbuilding material being far better off, owing to the generally healthy condition of the shipbuilding trade. In the north of England several works have had to stop from time to time, and the decline in rails has been as much as 10s. per ton, while ship angles and ship and boiler plates only receded 2s. 6d. a ton. In South Wales, where the dulness has, perhaps, been most severely felt, rails have lost 17s. 6d. per ton, while another staple product, tinplate bar, has gone down 20s. a ton. The Scotch steelmakers have been fairly well engaged, and they have now their orderbooks quite full. The decline in ship plates in Scotland has been 5s. a ton, and in boiler plates 15s. a ton, the difference in the reduction of prices plainly showing what kind of material was most called for. The steel trade of Sheffield, especially the heavy branches, has not had much to complain of, and, notwithstanding keen competition, the year will probably prove a fairly prosperous one for most concerns. The steelmakers of the Furness district have been fairly active, but those of West Cumberland have been rather quiet. The decline for the various steel products manufactured in the north-west ranges from 2s. 6d. a ton for ship-plates to 17s. 6d. for rails and 2*l.* for wire rods. Tinplate bars have advanced 5s. per ton, and hoops 20s. The Lancashire steel trade has been dull, and boiler plates, the principal product, have declined 10s. a ton.

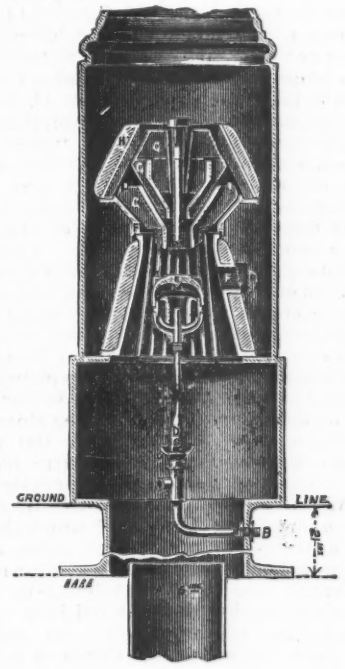
As we pointed out above, the shipbuilding industry has been fairly well employed during the year. The total output amounted to 1,268,470 tons, compared with 1,272,263 tons in 1890, comprising 748 steam vessels and 209 sailing ships in 1891. The difference in the tonnage, it will be seen, is not large, but what is more remarkable is that in some of the more important centres there has been a heavy falling-off, while others, hitherto of less importance, have come to the front. The royal dockyards also increased their output considerably. The prospects of shipbuilders are now hardly so bright as they were at the end of 1890. the amount of work in hand being much smaller. Marine engineers, in consequence of the fair activity in the shipbuilding trade, have been very well employed; but it deserves to be noted that in the past year the proportion of sailing vessels built has been far larger than in previous years. Otherwise makers of marine engines would have secured a better business than they actually did. Nevertheless, they have been better off than other departments of the engineering trades, although most engineering firms will enter the year with a fair amount of work in hand.

Happily, there have been no very serious disturbances in the relations between capital and labour. The most serious trouble was that with the engineers in the north-eastern parts, who, not content with quarrelling with their employers, took to fighting amongst themselves. We refer to the dispute between the plumbers and fitters. This, however, was at last settled, as was also the long-pending strike of the Scotch blast-furnacemen, who were utterly defeated. Another passing cloud was the demand for a week of fifty-three hours by the engineers in Lancashire, which, after some resistance by employers, was finally conceded. Sheffield manufacturers of cutlery, owing to depression, had to ask their men for a reduction of 5 per cent. in their wages. Some resisted, and were out for a long time; but others, being endowed with more commonsense, accepted the inevitable. Although not directly connected with the iron trade, the action of the South Wales coal-owners in giving notice to the colliers of the termination of the sliding scale has a bearing upon it. We need not enter into the merits of the case, but we may express the hope that the pending negotiations will end in a compromise; in the contrary case, a very serious rupture and disturbance in the labour market and the coal trade are to be apprehended. We may add that the fictitious cry for an eight hours' working day for miners appears to find divided sympathy even with those most concerned, and when astute politicians decline to express their opinions on such a delicate question, we may hope for seeing it shelved indefinitely, for it ought never to have been raised, British workmen, and especially British miners, having shown by their unions that they are well able to take care of themselves without interference by the legislature.

It is, as we know from experience, a very hazardous undertaking, at any time, to say much, either one way or the other, as to the trade prospects of a coming year. Appearances last year were so promising that we ventured upon a prognostication which would have come true [*if* the unforeseen had not happened. As the unexpected is a factor which has to be reckoned with, all we dare venture upon is to say that not too much should be expected of the year we have entered upon. It may, however, be observed that there is a fair amount of work in hand in most branches of the iron trade, and that the good harvests in America ought to give a fillip to business. Should the South American Republics settle down to a more orderly state of things than have prevailed lately, a revival may also arise from that quarter; but great caution will have to be exercised in the immediate future in trading with those countries.

HOLMAN'S "SEWER-GAS EXHAUSTER AND DESTRUCTOR."

MR. STEPHEN HOLMAN, M.Inst.C.E. (formerly of the well-known firm of Tangye Brothers & Holman), has for the last few years been devoting his attention to a means of relieving sewers of their poisonous gases without resort to open grids (which are often a nuisance), or to stack-pipes carried up the sides or fronts of buildings, to which there are often strong objections. Mr. Holman utilises the ordinary street lamp columns as his extracting-shafts and destructors. In the base of the column is placed what is at once the extracting and the destroying apparatus, as shown in the accompanying section, in which A represents a



6-in. pipe leading from the sewer, projecting 3 in. above the brick foundation on which the column rests (such foundation being not less than 21 in. below the ground-line), and within the lower end of the column. B shows the connexion for the gas supply from the street main, C the brass regulating governor of the burner, D the brass atmospheric burner, and E Holman's patent wind-proof burner-protector,—the bottom cup of this protector resting on the collar of the burner, the inner pieces being placed within that bottom cup, and the top part, E, above it. This cup is then surrounded and surmounted by a series of ribbed cones and chambers in cast-iron so arranged as to retain the heat of the burner in what is practically a furnace formed of a series of circuitous passages, through which the sewer air, drawn up the 6 in. pipe leading to the sewer, must pass and be rendered harmless, afterwards passing out by the upper part of the column through the lantern into the open air. After the burner with its protecting cups has been placed in position, the ribbed cones forming the body of the furnace are placed round it, commencing with the bottom cone which surrounds the burner; the flanged cone, F, is then placed on top of the bottom cone, and inside the flanged cone are placed, one after the other, the three cones, G, G, G, after which the central pin is dropped in and the top cone, H, is superposed. The top and bottom cones are covered with asbestos to prevent the radiation of heat. These extractors are in use by the London County Council, the Richmond Corporation, the Hornsey and Acton Local Boards, and many other local authorities, with satisfactory results, according to the testimony of the respective Borough Engineers and Surveyors. The burners are made to consume from six to eight cubic feet of gas per hour, at a cost of from 4½d. to 6d. per day of twenty-four hours. The apparatus, as tested by the anemometer, will extract from 40,000 to 60,000 cubic feet of sewer-air per day. Professor Wanklyn and other chemists speak very favourably of the efficiency of the "furnace" in rendering innocuous the sewer air which passes through it.

For use in connexion with the extractor and destructor at night, Mr. Holman has devised a very ingenious flash-light burner, by the use of which the gas can be lighted or extinguished without opening the lantern.

THE SALE OF WATER BY METER AT BERLIN.

AT the fifth ordinary meeting of the present Session of the Institution of Civil Engineers, on the 8th ult., the President, Mr. George Berkley, in the chair, the paper read was on "The Sale of Water by Measure in Berlin," by Mr. Henry Gill, M.Inst. C.E.

The author drew attention to the fact that the concentration of the population in cities, and the increasing severity of the tests for ascertaining the quality of water supplied to towns, made the difficulty and cost of obtaining sufficient and suitable water for domestic purposes greater each year. In addition, the enforcement of the laws for the protection of rivers against pollution added to the expense and difficulty of the disposal of the waste-water of town populations. These causes made it the interest of the municipalities, as owners of the water-works, not to restrict the supply, yet to prevent waste.

The fact was referred to that the water supplied to cities was far in excess of the actual requirements of the inhabitants, and that the excess not only served no useful purpose, but was wasted and was prejudicial to the community. The waste was not intentional, but was, in a great measure, the result of an imperfect system of supply and of the irrational method of charging for water. It was alleged that improvement could only be effected by the abandonment of the present system of assessment of the charges for water for domestic purposes, and the adoption of the system of sale by measure. The sale, exclusively by meter, as in the case of gas, would effectually prevent waste, and would reduce to a minimum the difficulty with reference to the disposal of sewage.

The condition of Berlin in 1865, when the tariff charge for water was a percentage on the rental, was then described, and how that system gradually gave place to the sale exclusively by meter, the transition being finally completed in 1878, with equal advantage to the purchaser and to the seller of the water. The nature of the meter employed, the place and method of its instalment, and the system of control, as well as the peculiar character of the Berlin houses, were detailed. The regulations and tariff charges were explained, and the effect of the system on the consumption per head was illustrated by tabular statements based on the Census of 1880, referring to a large number of houses in each quarter of the city. The effects on the expenditure and revenue were also illustrated by tabular statements for the financial year 1889-90.

The objections urged against the sale of domestic water exclusively by meter were referred to, and it was shown that these were not valid as regards Berlin, and that as to how far they might be valid for other cities could only be determined in each case by a consideration of the circumstances to be met. That these objections, however, did not prevent the adoption of the system in many cases in Germany, was shown by an official statistical table of the water supplies of 7⅔ millions, the inhabitants of seventy-seven German cities, in 26 per cent. of which the sale of water exclusively by meter and the control by meter of a considerable proportion of the remainder had been adopted.

It was conceded that the great stringency with which the various Governments enforced the laws for the protection of the streams against pollution had promoted the adoption of the system which was first introduced in Berlin.

Illustrations.

ST. PAUL'S CATHEDRAL.*

IN the illustration given this week of the celebrated London Cathedral, the object has been to select a point of view which would realise something of the soaring effect which the composition of the two campaniles and the dome presents to the eye when they are seen in conjunction on the approach from Ludgate-hill. In the flank view St. Paul's has too much the effect of a long box with a dome seated on the centre of it. Seen from the western position, where the campaniles group directly with the dome, the defect of this long level line is kept out of sight, and the whole assumes more the aspect of a spontaneously conceived architectural composition, with a unity of effect and conception which certainly does not strike one in the flank view of the building. In fact, the dome, which pre-supposes a wide central area perfectly different in character from the narrow "crossing" of a Mediæval cathedral with its central tower, is a feature much more fitted for the culmination of a plan of tolerably square proportions, a plan of the Greek cross type, than for a long narrow plan of the Mediæval type; it requires a pyramidal rather than a longitudinal composition; and there can be no doubt that Wren's architectural instinct was true in leading him to prefer his former plan for St. Paul's (the one worked out in the well-known model now in the Cathedral), in which a nearer approximation is made to the Greek cross type of plan, and the whole composition has more distinct reference to the dome as its central motive. The same principle is illustrated in the plan and design of St. Peter's, which must undoubtedly have presented a much finer external effect, as a composition, when in the dimensions left by Michelangelo, and before Carlo Maderno had added the lengthened nave which throws the dome back and prevents it from taking its proper place in the composition. St. Paul's is, in fact, a Mediæval plan treated as a Renaissance building, and the two elements do not harmonise.

A foreshortened view from the west realises this pyramidal effect of grouping which the dome seems to require, and affords an opportunity of throwing the more delicate and graceful treatment of the campaniles into contrast with the broad mass of the dome behind, the two features mutually assisting each other by contrast. There is no accessible point on the ground level, however, from which this combination could be shown in a drawing without distortion. There are photographs which give fine combinations of the dome and campaniles, but they are all taken from the roofs of houses, and even then the dome is in some cases either distorted or thrown too far back or too low in the composition, and loses its rightful predominance. We have therefore assumed a point of view sufficiently far back to allow the dome to be seen in its true proportions in combination with the campaniles. The assumed standpoint is distant from the building about two and a-half times its own length, and the proportions have been carefully worked out in perspective, from the plan and from Gladwin's careful engraving of the north elevation, made in 1828, a copy of which, in the possession of Mr. Penrose, he has very kindly lent to us for the purpose. Of this engraving we give with this number a zincograph reproduction, about two-thirds the size of the original, which may be of interest, as correct geometrical drawings of St. Paul's as a whole, and on a large scale, are not very plentiful or easy to come at;† and Gladwin's engraving, though in the formal mechanical style in vogue at the time it was made, has the merit of being an exceedingly correct representation of its kind, in every detail.*

The Queen Anne Monument, which should naturally have shown in the view, has been omitted intentionally, since it is no part of the building, and from this point of view it would have obtruded awkwardly in front of the cathedral. The peculiar effect of the weathering on the building, which has divided its two stages almost precisely, over most of the building, into a light-coloured story above and a dark and smoke-blackened one below, it may be said is also an accidental effect having nothing to do with the architectural design of the building; but it is too characteristic and picturesque an effect, and too much blent with every one's recollection of the building, to be omitted. The sharp line of demarcation between the upper and lower stories almost suggests the idea that a different bed of stone had been employed in the upper portion; but the result is due, we believe, merely to the greater effect of rain on the more exposed upper portions, coupled with the fact that the cornice of the lower order affords a protection from rain to the parts immediately beneath it, and thus gives that marked separation between the blackened and the cleaner portions. The plinth stones are whitened again where the drip from the cornice has fallen on them, and the angle pilasters at the exposed south-west corner have also got their share of cleansing.

St. Paul's occupies a very different position from any of the cathedrals already illustrated in this series, and from nearly all those which will follow, in the fact that it was built in the post-mediæval period, and is the individual work of an architect whose name and history are well known. The building of St. Paul's followed, of course, upon the destruction of the Gothic cathedral in the great fire of London, but it is not popularly known, probably, that before that event the old Cathedral had been so much damaged by fire and neglect combined, that a complete scheme for its restoration had been formed, first entrusted to Inigo Jones, and latterly in the reign of Charles II. to Wren, who intended to add to the mediæval cathedral additions in the Italian style, "after a good Roman manner, instead of the Gothic rudeness of the old design." It was in the consideration of the method of doing this that Wren first suggested the idea of the central space with a dome over it, which was eventually to form part of his new design. In 1666 the estimates for the work had actually been ordered, when the great fire broke out and (perhaps fortunately) put an end to all idea of this patchwork of Gothic and Renaissance, by destroying the old church completely.

The first stone of the present Cathedral was laid on June 21 1675, and the top stone of the lantern laid in 1710. Before the existing design was finally adopted, there had been (besides stray sketches) two other designs made by Wren. One of these is the Greek cross design already referred to, of which the model was made, and another is one which received the formal approval of the King, but with leave to deviate from it, fortunately for us and for Wren's reputation, for this officially approved design is unquestionably the worst of the three. The central feature is a kind of melange of a dome with a minaret on it, and it is difficult to understand how an architect capable of designing the dome as we see it could have ever thought of erecting such a barbaric affair. In regard to the first design to which we have already referred, on the Greek cross type of plan, while there is no doubt that the plan was the finer and the general conception of the whole broader and more dignified than the present building regarded as a whole, we cannot share the wish sometimes expressed that the design shown in the model had been carried out in place of the present building. The type adopted is far better, but the details are much inferior, especially of the dome, which is far more refined, more graceful, and better proportioned than in the "model" design.

The plan of St. Paul's is changed in axis from that of the old cathedral, partly to get rid of the difficulty which would have been caused by building on the site of walls whose foundations could not be depended upon, and which it would nevertheless have been a work of great labour to entirely remove. As matters are, the oblique position toward Ludgate-hill which the Cathedral assumes is hardly a disadvantage to it, as it is so closely shut in by houses and so entirely devoid of anything like a grand approach that it seems better that it should have the element of irregular picturesqueness in its position, since that of stateliness is out of the question. It is greatly to have been desired that the surroundings of the Cathedral should have been laid out in a more stately and spacious manner while there was the opportunity afforded by the destruction of house property wrought by the fire; but in the natural eagerness of owners to repair their misfortune as soon as possible, the re-building of the adjoining houses had been commenced before anything was settled as to the plan of the Cathedral site, and Wren had to accept the position. As it stands, the Cathedral loses much of the dignity of effect it might have had on a better arranged site, and moreover there is no point whence it can be seen as a whole. On the other hand it perhaps gains a certain effect of sublimity,—what we have called its "soaring" effect,—from the very fact of rising out the confined mass of inferior buildings so closely surrounding it.

The two chapels eastward of the western towers were added to the plan much against the will of Wren, in order to be used as chapels to special saints in case the Romish ritual could be restored, as James II. secretly wished. Internally they are an addition to the architectural variety of the church, but externally they are an excrescence and a detriment to its effect, fitting awkwardly against the base of the towers, and shortening the apparant length of the nave when seen in perspective.

Architecturally speaking, the campaniles and the dome are the making of St. Paul's. The design of the substructure is very commonplace, consisting of a double order of applied pilasters repeated in an almost mechanical and formal manner all round the building; and the windows are of poor and ineffective design. The worst thing about it all, however, is the fact that the upper half of the wall is for the most part a mere empty sham with nothing behind it, and when once this is known it is impossible to forget it, or to have the same feeling towards the building which a spectator might have, despite its defects of detail, who believed its external visible mass to represent its interior arrangement and contents. The floral ornament above and about the windows is in the artificial taste of the day, and cannot be called ornament, being merely sets of festoons with no design whatever, though with a certain boldness and freedom of execution. The sculpture is respectable, and nothing more. The double-storied colonnade of the façade has however a fine effect, partly owing to the deep shadow from the recesses behind the columns; this in fact just shows what it is that the rest of the building wants; it is all too flat. All these faults of the substructure, however, are forgotten when the eye rises to the campaniles and the dome. The former are most graceful and original in design, and as full of play of surface and light and shade as the substructure (except the portico) is destitute of it. The dome, with its fine colonnade, with the original and truly constructive treatment of the solid bay at every fourth inter-columniation (marking the main points of support of the dome), and the deep recesses between and behind the columns, is a noble piece of architecture of its kind; and the actual dome, with its finely-curved outline, rises in a most effective and graceful manner above the main colonnade behind which it is recessed. The lantern also is a very graceful structure, though rather too heavy for its apparent situation; and here again we come on the drawback of want of architectural truth. The merest tyro in construction knows that the stone lantern could not stand on that timber dome; and the concealed cone to carry it (the line of which is partially discerned however, and not disagreeably, behind and between the main colonnade) only half reconciles us, by its ability and novelty as a constructive device, to the æsthetic sin which has been perpetrated. In a previous study for the dome Wren had adopted, like Brunelleschi, the device of a slightly-pointed masonry dome to carry the weight of the lantern, ingeniously counterweighting its exterior thrust at the base by a cove hung inwards. It is a pity that he did not adopt this completely logical constructive expedient, which would have made the exterior dome a reality instead of a sham.

With all these drawbacks, however, St. Paul's

* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 3, 1891. A list of those already illustrated, with particulars of future arrangements, will be found on page 20.

† The plan of St. Paul's given here is based on a large scale and very carefully-engraved plan in the possession of Mr. Somers Clarke, who was good enough to lend it to us as a basis of operations. It has been supplemented by measurements and observations on the building.

* The steps to the west entrance are not as shown in the engraving, but they have been altered since it was made.

dome remains one of the great things of architecture, which has produced few structures at once so grand and so graceful, and we do not say that the popular admiration of it is at all more than it justly claims.

We may call attention to one aspect of the colonnade which architects and artists will enjoy, though it cannot be shown on a drawing in consequence of the conditions of perspective drawing. Go on a bright day into the southern enclosure of the railed space, stand near the remains of the old cloister and carry the eye up the re-entering angle of nave and transept. Over where the two cornices meet curves the colonnade of the dome, three or four bays only visible, the whole depth and solidity of the construction emphasised by the manner in which we look up between the columns to the very back of the soffit over them, and realise the scale and the projection of the colonnade, crowned by the sweep of its cornice against the sky. The effect is quite sublime. H. H. S.

STAIRCASE, ST. PAUL'S CATHEDRAL.

THIS is a measured drawing by Mr. Stephen Ayling of the staircase in the south-west tower leading to the library. It serves to illustrate the style of the decorative detail within the building. The design of the ironwork is very good; the carved detail is in the usual style of the day. It may be a question, perhaps, whether Wren had very much to do with the design of these details; he was, in fact, an example of "that hybrid person, the Surveyor-Architect," of whom we have heard so much lately.

OLD ST. PAUL'S CATHEDRAL FROM THE NORTH-EAST.

As we have described Old St. Paul's Cathedral previously in a series of illustrated articles which have from time to time appeared in our columns, all we propose now to do is to say a few words about the drawing which we publish. In the first place, our readers will want to know what authorities exist for this "restoration." For this purpose the indications discovered by the excavations made under the direction of Mr. Penrose some years ago have been carefully studied. These show the form and the position of the east end of the church, the base of the respond at the south-east angle existing complete. It would appear from the foundations, which we have measured according to the indications marked out at the time the excavations were made, that the great east gable measured 36 ft. 6 in. between the buttresses; that the principal buttresses themselves were 7 ft. 2 in. wide; the aisles 15 ft. wide; and that the two buttresses at the angle of the aisle, which stood at right-angles to each other, measured together 14 ft.; that the great preaching-cross was 30 ft. distant from this point, and that, including steps and parapet, it was 36 ft. in diameter. The eastern wall of the church appears to have been 7 ft. 2 in. thick, but the aisle wall, on the north side, seems to have been as much as 10 ft. thick! This is corroborated by Hollar's drawings, because he shows wall passages in the aisles and none to the clearstory; several of his illustrations also show that the aisle walls were thick enough to admit of monuments being let into them without cutting through the wall arcade. The tombs of King Ethelred and King Selba are cases in point.

Our view represents the church before the destruction of the spire in the year 1559. A drawing by Wyndgarde, the "Cowdray Picture," and a view by Hollar show the cathedral in this condition. The spire was of wood, and was, together with the parapet of the tower, erected in the year 1462, replacing one which was destroyed by lightning in 1444. Probably also at this time the flying buttresses at the base of the tower, were erected. They are shown by Hollar supported by plain, upright bars of stone, which look exceedingly ugly, but an earlier view by Vischer, 1616, shows these fillings-in as consisting of perpendicular mullions with ogee tracery heads between them. A very curious old picture of St. Paul's, from almost the same point of view as our illustration, is engraved in Wilkinson's "Londina Illustrata." It shows the preaching-cross, and King James I. attending a sermon preached therefrom. The gallery and Royal closet were then in existence; in fact, they probably remained until the year 1643, when the cross was pulled down by Lord Mayor Penington. The Consistory-court, together with its shrouds and cloisters, would seem to have been perverted to secular uses, because a number of chimneys are shown, with smoke rising out of them, over which is the following inscription:—

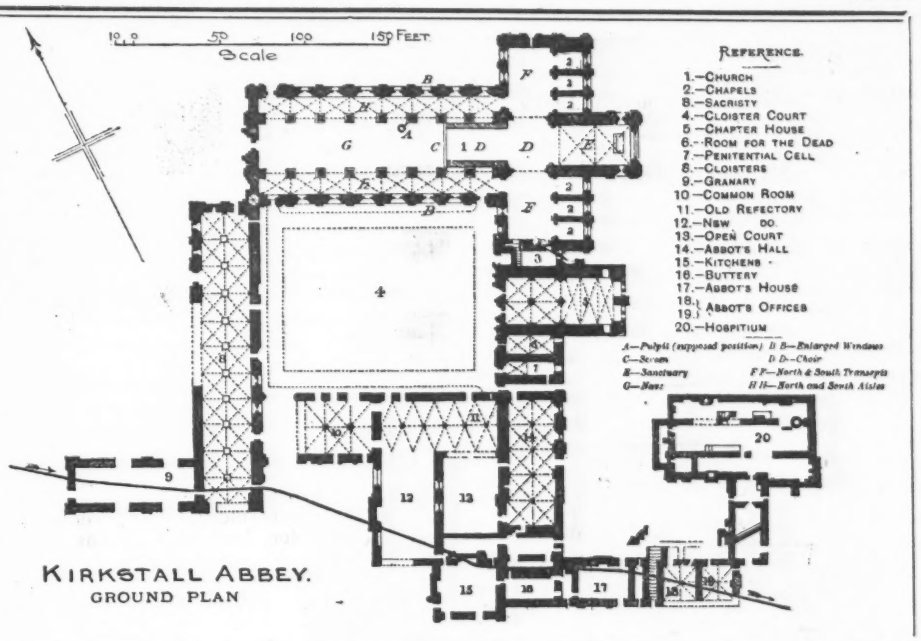
"Viewe, O! Kinge, howe my wall-creepers
Have made me worke for chimney-sweepers."

Another portion of the same painting is engraved in Nichol's "Royal Progresses of James I." This work is supposed to represent James I.'s visit to St. Paul's for the purpose of getting that monarch to restore the cathedral. There appears to have been some difficulty, however, about the matter, since, although the picture was painted representing the royal visit, James seems not to have gone until several years later, and, with his usual caution, appears to have suggested that so good a work should rather be the result of a "General Benevolence," than of a royal grant! The end of the whole proceeding is described by Dugdale as follows:—

"The collection of monies went so slowly forwards as that, though a good proportion of stone was brought in by the bishop, the prosecution of the work became wholly neglected, so that part of the said stone, lying useless, was after borrowed by the Duke of Buckingham for the building of the Watergate at York House, and there employed for that use." Of course this must not be confused with Laud's Restoration, which was not commenced until 1628.

The preaching cross was constructed of wood, and was rebuilt by Cardinal John Kemp. Dugdale appears to be wrong upon this point, as he attributes it to Thomas Kemp, Bishop of London. Kemp's arms were to be seen upon the leadwork of the roof. It was erected between 1422 and 1426. Sherrington's Chapel, Pardon-Church-Haugh, and the Charnel were pulled down by Protector Somerset, and their material used to erect Somerset House. The great campanile, called the clochier, is indicated in Wyndegarde and Vischer's views. Dugdale tells us that "within this clochier were four very great bells, called Jesus bells, in regard they specially belonged to Jesus Chapell, situate at the east end of the Undercroft of Paul's; and also, on the top of the spire, the image of Saint Paul, all standing till Sir Miles Partridge, Knight, temp. H. VIII., having won them from the King at one cast of the dice, pulled them down. Which Sir Miles afterwards, temp. E. VI., suffered death on Tower-hill for matters relating to the Duke of Somerset."

These isolated bell-towers seem to have been in frequent use in England during the Middle Ages, especially in the case of large and important churches. That of Chichester Cathedral still exists, and those of Salisbury, Westminster, and Worcester have only disappeared within the last two centuries. It is not quite known when the one belonging to St. Paul's Cathedral was finally destroyed; but, as it does not appear to be indicated in any view of a later date than Vischer's, and had entirely disappeared when Dugdale wrote in 1657, it is possible that, when the Duke of Buckingham "borrowed" the stone, brought for the restoration of the cathedral, he may have completed the destruction commenced by Sir Miles Partridge by "borrowing" the stone of which the tower was built also. H. W. B.



KIRKSTALL ABBEY.
GROUND PLAN

ST. PETER'S DOME, FROM THE PIAZZA DELLA SAGRESTIA.

THIS is a reproduction of a drawing by Mr. Fulleylove, whose reputation as an artist dealing with architectural subjects is well known to our readers. It gives a rather unusual and little known view of the dome from a terrace, "Piazza della Sagrestia," high above the ground level of the Cathedral, and shows the dome and the upper part of one of the transepts; the angle of the façade is seen beyond.

OLD ST. PETER'S, ROME.

INFORMATION as to this drawing will be found in Mr. Brewer's article on an earlier page.

NORTH TRANSEPT, WESTMINSTER ABBEY.

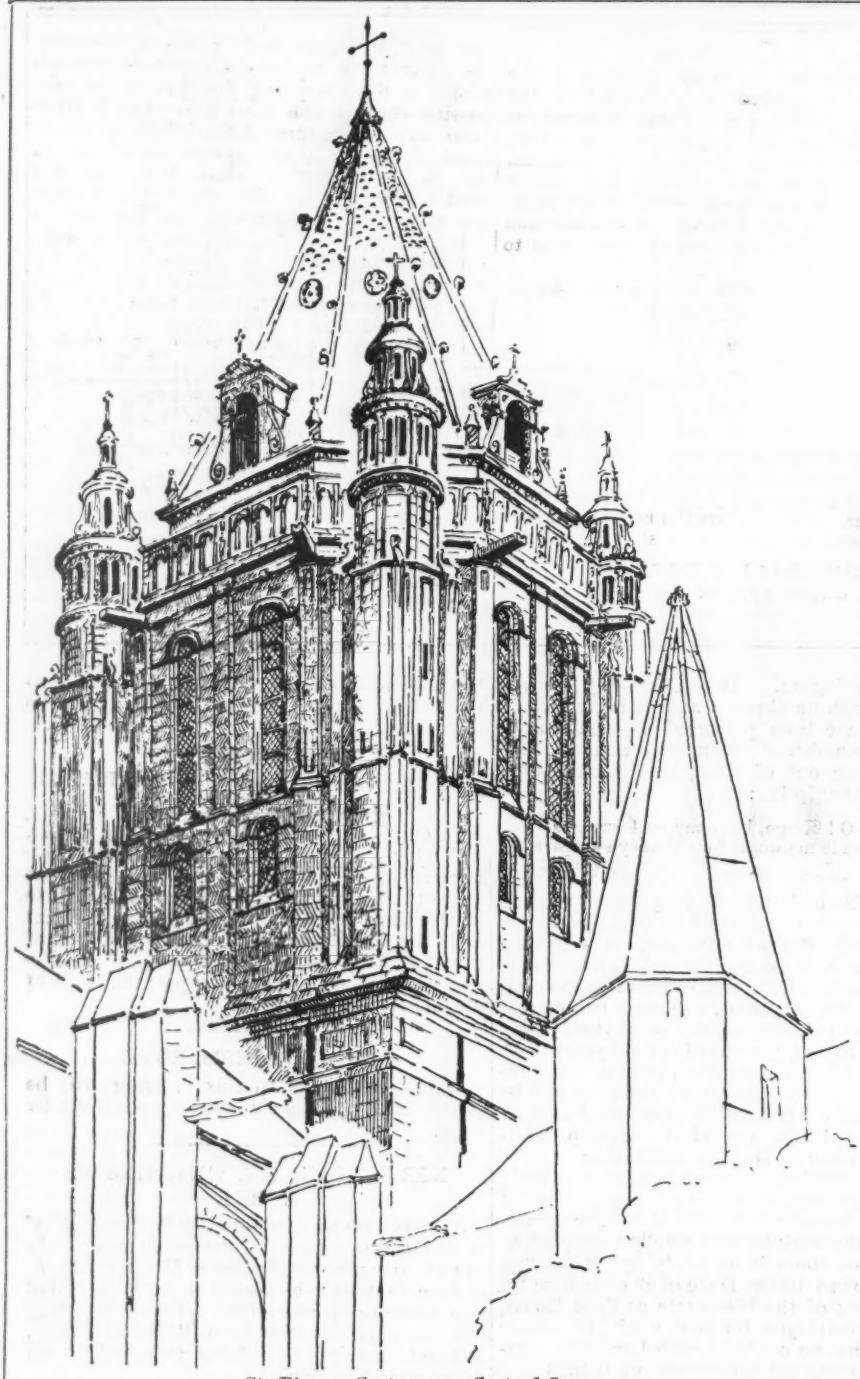
THIS is such an exceptionally fine example of what must be called restoration, so completely in the true spirit and feeling of Mediæval architecture, that we have wished to put it on record in a drawing worthy of its merits. Mr. Begg has taken special pains in the illustration of it, and as to the result we think there will be no difference of opinion.

THE KLINGEN THOR, ROTHENBURG, BAVARIA.

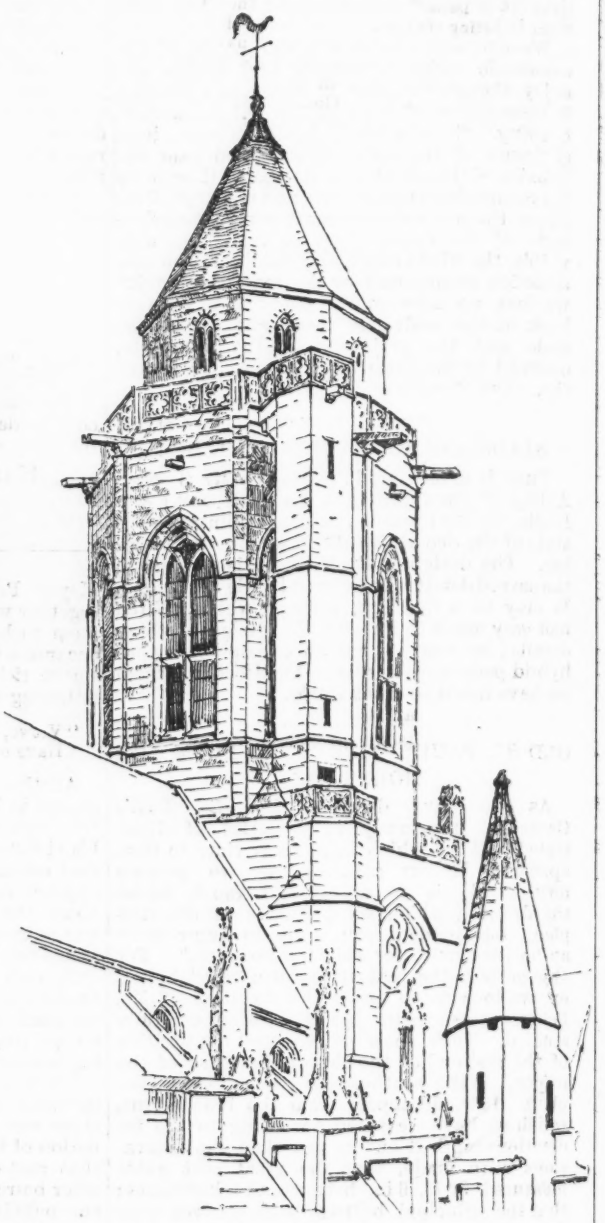
THE fortifications of this interesting old town remain to-day in much the same condition as when they were completed and put in order for resisting the siege by Tilly in the thirty years' war. The town is of moderate size, completely encircled by walls, and each gate is guarded by an outer postern and tower; these are in each case intact. The Klingen or bell-tower is one of the largest and most interesting. The sketch shows the back of the tower towards the town, with the traces of the ancient clock-face. The galleries upon the walls are quite accessible as walks for visitors. The sketch shows the stairs to one section of them. Other views of Rothenburg have appeared in the *Builder*, by Mr. H. W. Brewer, and architectural artists in search of picturesque colour and old world scenes are to be recommended to try this quaint town, situated between Wurzburg and Nuremburg.

KIRKSTALL ABBEY.

THE Cistercian community originally at Bernoldswic removed to the site of Kirkstall, near Leeds, in 1152, and the church was completed about thirty years afterwards. The building is one of the best known in Yorkshire, and is still a fine specimen of Norman transitional work. The central tower, the turrets flanking the gables, and also the tracery in some of the windows, are of Perpendicular date, the tower having probably been added by Abbot Marshall, 1509-1528. The situation of the Abbey must have been a very fine one. Its



St. Pierre, Coutances: Central Tower.



Secularised Church of St. Étienne, Caen: Central Tower.

picturesqueness has now, however, largely disappeared, owing to the close proximity of Leeds and its outlying suburbs.

The photograph, an unusually good one, from which the illustration is reproduced, was taken by an amateur photographer, Mr. William Brown, of Leeds, and was sent to us, with permission to reproduce it, by Mr. G. Atkinson, of the same town. The publication of an illustration of Kirkstall has some special interest at present, inasmuch as there has been a great deal of dissatisfaction expressed of late at the removal of the ivy from the ruins, and a good deal of paper warfare has ensued on the subject; and it may be of interest to those who loved the old aspect of the Abbey to have a memorial of its aspect before the ivy was removed.

We should add, however, that while admitting that an ivy-clad ruin is far more picturesque than one of which the walls have been laid bare, we are not by any means blaming those who were responsible for removing the ivy from Kirkstall. The preservation of the remains of a great monument of Mediæval architecture is, after all, of more importance than the picturesque effect of the ivy; and there can be no doubt that the growth of ivy over remains of this kind hastens their destruction as architectural monuments.

"LE TEMPS PORTANT LA RENOMMEE."

"TIME bringing Fame" to Delacroix is the idea which M. Dalou has adopted for the monument to the eminent painter lately erected in the Luxembourg Gardens. Possibly the group may be criticised as being rather too full of movement for the true conditions of sculpture; but it has the great merits of boldness, spirit, and originality, and is one of the most striking works which French sculpture has recently produced.

Delacroix, who was born in 1799 and died in 1863, was one of the most remarkable of the distinguished French artists of the earlier part of the century, a painter of much originality of conception and great power as a colourist. His memory is celebrated in a monument worthy of his reputation.

TWO FRENCH TOWERS.

THESE illustrations of two characteristic French Mediæval towers are reproduced from sketches by Mr. R. A. Reid.

MEMORIAL STONE, KIRKINTILLOCH.—On the 19th ult. a memorial to the late Miss Beatrice Clugston was unveiled in the Old Aisle Cemetery, Kirkintilloch. The memorial, which is in the form of a red-stone monument of the English Gothic style, with a cast bronze panel inserted in the centre, stands at the head of the grave, and is 8 ft. broad at the base and 13 ft. high. The bronze panel is the work of Mr. Pittendrigh M'Gillivray, sculptor, Glasgow, and has in the lower part a group of figures representing charity, and above this a medallion portrait of Miss Clugston. The design of the monument was by Mr. W. F. Salmon, F.R.I.B.A., Glasgow, who superintended the work.

THE LONDON COUNTY COUNCIL.

AT the special adjourned meeting of this Council held on Wednesday, the 23rd ult., Sir John Lubbock, Chairman of the Council, presided.

The Bethnal-Green Slum Clearance.—The Housing of the Working Classes Committee reported as follows regarding this scheme:—

"The Council may desire to be informed of the progress being made in carrying the Boundary-street scheme into execution. The Provisional Order for the scheme was, after a local inquiry, confirmed by Parliament on July 3. The estimate of the cost of purchasing the lands and houses in the area, including trade and tenants' compensation, was 371,000*l.*; 129 claims have been received up to date, representing in the aggregate 414,856*l.* About forty-seven claims, it is calculated, remain to be received, the total amount of which will probably be about 90,000*l.* As regards the 129 claims received, negotiations are proceeding with respect to the greater number of them, and fifteen have been settled. The aggregate of the claims in these fifteen cases was 16,998*l.*, and the aggregate of the amounts at which they have been settled is 12,585*l.* Thirty claims have been referred to the Solicitor for submission to the Arbitrator, who will in due course be appointed, to decide the amount to be paid in all cases where agreements are not come to. There are in the area eleven licensed public-houses in respect of which claims have been received."

The Goldsmith-square Site.—The same Committee also reported with regard to the Goldsmith-square site in the following terms:—

"Before that portion of the Goldsmith-square site which is to be utilised for artisans' dwellings

can be put up for sale it will be necessary to carry out the widening of Goldsmith-row. Your Committee have issued instructions for the demolition of the existing buildings, and have directed the Engineer to carry out the necessary paving works in connexion with the widening of Goldsmith-row, and also the paving works in connexion with the widening of that portion of Goldsmith-square which is required for the line of frontage of the artisans' dwellings proposed to be erected on the site. It is estimated that the cost of these works will amount to £600. An estimate for this amount will be submitted by the Finance Committee concurrently with this report. Your Committee recommend,—

'That the necessary paving works in connexion with the widening of Goldsmith-square and Goldsmith-row be carried out under the general contract at a cost not exceeding £600.'"

The recommendation was agreed to.

Rosebery-avenue.—The first paragraph of the Improvements Committee's report was as follows:—

"We have to report that the portion of the Rosebery-avenue improvement from Garnault-place to St. John-street-road, having been completed, was opened to the public by our Chairman, and the charge of the thoroughfare formally handed over to the local authority within whose district it is situated (the Vestry of Clerkenwell), on December 16. The Metropolitan Board obtained Parliamentary powers for this improvement in 1885. The contract for the works of the completed portion was entered into with Messrs. Mowlem & Co. in May, 1891."

Proposed Extension of the Chelsea Embankment.—The second paragraph of the same Committee's report ran thus:—

"On July 22, 1890, we reported to the Council in favour of continuing the river embankment from Battersea Bridge to Lots-road, Chelsea, on condition that the Vestry of Chelsea contributed one-half of the net cost of the work to be executed by the Council, such net cost being estimated at 62,000*l.* After considerable negotiation, the Vestry declined to contribute more than 8,000*l.*, although it required to have possession, free of cost, of the whole land to be reclaimed from the river, about 3¾ acres. The Vestry has asked that the question may now be re-considered by the Council, but, having regard to the resolutions of the Council of October 6 last, which were to the effect that the Council would defer further street improvements until some portion of the cost could be thrown upon the owners of property, we propose to give instructions for the Vestry to be informed that the Council is not at present prepared to entertain the matter."

After some discussion, the report was agreed to.

A Palm-house for Battersea Park.—The Parks and Open Spaces Committee's report began with the following:—

"We have had our attention called to the desirableness of providing a palm-house in Battersea Park, not only for the accommodation of the palms which have outgrown the existing greenhouses, but also to be used as a winter garden and for the exhibition of chrysanthemums and other flowers. We submit a plan of the building, and propose that the central portion of it should be erected, leaving the wings to be added if necessary at some future time. We recommend,—

'That, subject to an estimate being submitted to it by the Finance Committee, as required by the statute, the Council do authorise the expenditure of 1,500*l.* on capital account, for the erection of a palm-house in Battersea Park, in accordance with the design submitted.'"

This recommendation led to a long discussion, but eventually it was carried.

Bethnal-green Poor's Land.—The seventeenth paragraph of the same Committee's report related to this much-fought-for piece of land, and was thus worded:—

"The Council will recollect that for some years the question of acquiring the land known as the Bethnal-green Poor's Land for the purpose of an open space has been before it, and the Council has already expressed its readiness to acquire the land, which is about 6½ acres in extent. According to a new scheme prepared this year by the Charity Commissioners, the trustees are to sell the land to the Council, and we consider that now is a fitting time for the Council to make an offer for the land. We therefore recommend,—

'That, subject to an estimate being submitted to it by the Finance Committee as required by the statute, the Council do make an offer of 5,000*l.* for the land known as the Bethnal-green Poor's Land, comprising approximately 6½ acres, in accordance with the terms of the new scheme prepared by the Charity Commissioners.'"

This recommendation was unanimously agreed to.

The Building Acts.—After a short discussion, the Council, on the recommendation of a special report of the Building Act Committee, printed by us last week,* agreed that the Council do express a general approval of the Committee's suggested amendments† to the Metropolitan Building and Local Management Acts, and authorise the Building Act Committee to lay them before the President of the Local Government Board, and to confer with him as to any other amendments which may appear desirable during the progress of the Bill, and report the result to the Council from time to time.

Having transacted other business, the Council adjourned until Tuesday, January 19.

NEW BLIND FITTINGS.

MR. W. HENRY THOMPSON, of 147, Queen Victoria-street (son of the well-known contractor, Mr. John Thompson, of Peterborough), has brought to our notice a very simple though at the same time very ingenious Venetian blind-cord-holder. Fig. 1 shows the new holder with the cord secured, and fig. 2 shows the same with the cord released. Among other advantages of this holder, which we have seen in action, we may mention the non-liability of the cord to kink, and the rapidity and facility with which the blind can be raised or lowered to any desired extent. The action is as rapid and as easy as that of a good spring roller blind. To raise or lower the blind the cord has to be held close to the window frame, and either pulled down or allowed to slide up, as the case may be. When the blind has attained the desired position, the cord is simply pulled away from the window frame so as to raise the clutch, and the blind is instantaneously secured.

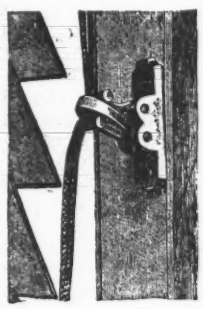


Fig. 1.

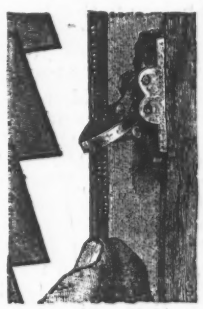


Fig. 2.

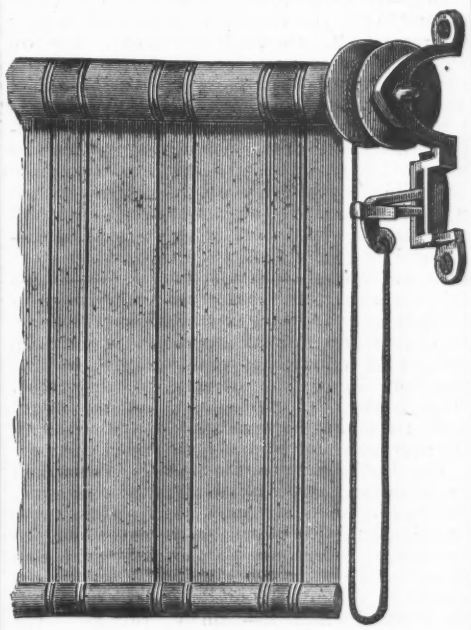


Fig. 3.

For roller blinds Mr. Thompson is also introducing a new and simple mechanical device for raising and lowering the blind, combined with a cord-holder. Amongst the small evils which householders have to bear, perhaps there is none more trying than the usual form of blind-cord-holder, which often either fails to hold at the proper moment, or wears out and cuts the cords prematurely. These defects appear to be entirely done away with in the cord-holder now under notice, which, as will be seen by the accompanying engraving, fig. 3, consists of two small arms, pivotted on different centres, the outer end of the upper arm passing through a slot in the lower one, the cord to be held passing through the same slot. The holding power is obtained through the differential movement of the arms, any upward movement of the arms tending to close them on the cord. The greater the strain the greater the grip, but the pressure on the cord is only just sufficient to hold the blind, automatically increasing or decreasing as the weight varies, thus preventing the fraying and cutting and wearing-out of the cords. As will be understood from the engraving, the revolution of the roller, when the blind is descending, winds the cord round the reel or drum; by pulling the cord down it winds off the reel or drum, turning the roller with it, and so raising the blind.

Mr. Thompson is also introducing a very handy and ingenious little tool, named the "Eureka" tack-driver. It is chiefly suited for domestic use, and consists of a brass socket, fitted with a magnetised plunger, worked by a coiled spring. The plunger picks up the tack, head-first, and recedes with it into the socket. A smart blow with the palm of the hand on the knob at the top of the plunger-rod or handle compresses the spring and protrudes the plunger, driving the tack into the desired position. No hammer is required.

* See *Builder* for December 26, 1891, p. 487.

† We have received a copy of these amendments, but in the absence of the text of the Bill proposed to be introduced by Mr. Ritchie they are not very intelligible.

COMPETITIONS.

SCHOOL BOARD OFFICES, KEIGHLEY.—The designs for new School Board Offices, Keighley, submitted in limited competition by Mr. Ledingham, architect, Bradford, have been selected.

SCHOOLS, CHADSMOOR.—The Cannock School Board have selected the designs of Mr. Geo. H. Cox, architect, Birmingham, for the proposed schools at Chadsmoor.

Books.

The Mechanical Engineer's Pocket-book. By D. K. CLARK, M.Inst.C.E. London: Crosby Lockwood & Son. 1892.

ANY attempt to bring to a focus the vast accumulation of knowledge with which it is desirable that an engineer should be acquainted, so that its practical value may at once be evident, will always be welcome to professional men. So much information has now been published in technical works, and is to be found scattered through the proceedings of the various scientific societies, that it is becoming more and more necessary to have it condensed for actual use; and no one is better able to undertake such a work than the author of this book. The amount of information that it is possible to compress into a work of the pocket-book class is, of course, somewhat limited, as a considerable portion has to be given up to such mathematical and other tables as are so often needed, but Mr. Clark has devoted the chief part of his work to such formulæ, rules, and data, as are required in the every-day practice of the mechanical engineer. In our opinion, the student who would study such a book as this in the same way as he would any other good technical work, and carefully read through it, committing to memory the more important formulæ and data that the author has taken so much care to select and arrange, would, in a short time, have ready for instant use an amount of information which has only been discovered after years of hard work by men who have devoted their lives to scientific investigation.

The Pre-Norman Date of the Design and some of the Stonework of Oxford Cathedral. By JAS. PARK HARRISON, M.A. With illustrations. London: Henry Frowde. Oxford: Clarendon Press. 1891.

THIS is only a pamphlet, a reprint of a paper read at a meeting in the Chapter-house at Oxford some little time since, but it is of more than passing interest, as in his treatment of the subject the author takes up the general question as to the correctness of the date assigned to some supposed transitional carving, and gives illustrations from Saxon missals to show that ornamental details exceedingly like those of many such capitals are actually found in Saxon illuminated missals. The question in regard to Oxford Cathedral partly rests on a study of the stonework in detail, and without

making a special visit of inspection we could not undertake to pronounce on the validity of Mr. Harrison's views; but his paper is sufficient to show that the question is more open to discussion that has been generally supposed.

An Architectural Memoir of Old Basing Church, Hants. By the Rev. REGINALD A. CAYLEY, M.A. Basingstoke: C. J. Jacob. 1891.

THIS is a well-written description, in the form of a pamphlet, of a church which seems to have more points of archæological interest than it is generally credited with, and which rather goes to persuade the reader, as Mr. Cayley suggests, that those who are interested in old churches would find it worth while to break a journey at Basingstoke and visit the church (two miles from the railway). Mr. Jas. A. Salter, F.R.S., adds some details as to the monuments and their heraldry.

The "Law Almanack" for 1892, edited by Frederick Herbert (London: T. Scott & Co., 1, Warwick-court, Holborn), is a very useful and clearly-printed sheet for the office wall. ——Messrs. Shand, Mason, & Co., of Upper Ground-street, Blackfriars, send us a useful office-calendar, containing a spirited drawing, by Mr. Linley Sambourne, of firemen at work at the scene of a fire.——Messrs. John Ellis & Sons, of Leicester and Barrow-on-Soar, also send us a useful calendar, containing some very well-executed representations of fossils from the blue lias limestone at Barrow.

The General Manager of the Great Western Railway sends us a pamphlet entitled "Cornwall as a Winter Resort," which merits the attention of invalids and their friends. The pamphlet is published by Messrs. Waterlow Bros. & Layton, Ltd., Birchin-lane. With it come two small guide-books, entitled "The Winter Resorts of Cornwall," and "A Holiday Trip Round the Pembroke Coast." Both these are published by F. E. Longley, 39, Warwick-lane, E.C.

RECENT TRADE CATALOGUES.

THE General Iron Foundry Company, Ltd., of Upper Thames-street, send us their new illustrated price-list (extending over more than 200 pages) of open, close, and self-setting ranges; tile and mantelpiece registers; overmantels; iron, marble, and wood chimney-pieces; rain-water pipes and gutters; socket-pipes, hot-water apparatus, baths, and sanitary ware; stable fittings, and general castings. The whole forms a very useful and comprehensive catalogue, and as it is well indexed, reference to any item in it is made easy.

Messrs. F. W. Reynolds & Co., of Southwark-street, send us a useful illustrated list of warming and cooking stoves and heating coils and radiators. The "Lucifer" slow combustion stoves, made in both square and round forms, and with large movable ashpans, appear to possess many good points. The same firm send us, from their other establishment, Acorn Works, Edward-street, Blackfriars-road, a sheet of very handy wood-working machines made by them. Both lists are well worth the attention of builders.

Woodhouse & Rawson United, Limited, Queen Victoria-street, send us two catalogues (List "B," Section 5, and List "B," Section 8) of electrical machinery and apparatus connected therewith, including engines, dynamos, accumulators, lamps, switches, fittings, instruments, &c. They are well worth attention, though the design of some of the electroliers and other fittings might be a great deal better than it is. Section 8 deals with steam and electric cranes, lathes, drilling-machines, tube-welders, &c.

Messrs. Taylor & Miller, of Argyle-street, Glasgow, send us an illustrated prospectus of "The Safety" Window, which presents many good points, though we have seen something very like it years ago. While retaining the ordinary sliding sash movement, both sashes can be opened into the room for cleaning, painting, or reglazing, without removing the parting-beads and without the jamming of weights. It is claimed that these windows are wind and water-tight.

BRITISH MUSEUM LECTURES.—Miss Millington-Lathbury is giving a series of four lectures on Greek Temples, Festivals, &c., at the British Museum, on January 28 and February 4, 11, and 18.

Correspondence.

To the Editor of THE BUILDER.

THE INSTITUTE AND ITS EXAMINATIONS.

SIR,—In your leading article of December 26, you refer to the passage in my letter, published in the same issue, where I speak of the surveyor-architect as "that hybrid personage of whom you think it unreasonable and impracticable that we [the memorialists] should want to get rid." Your reply is to the effect that when a man has been elected into the Institute as an architect it would be hard and un-Christian to turn him out because he earned an honest penny now and then, or habitually, by surveyor's work.

Very likely it would; but if I have rightly understood your reply, it does not meet my statement. When I said we wanted to get rid of the surveyor-architect, I did not mean to get rid of him out of the Institute. That is, of course, a matter of no concern to those who do not belong to that body. Our object is to get rid of the "surveyor-architect" altogether, and to get surveyors to stick to surveying, and architects to architecture. All we contend for is that the architect and the surveyor should stick each to his own last, and not be tempted by distracting, though possibly lucrative, invitations to follow two incongruous callings at once; because, if he does, it is certain that he will never make a good architect, and will probably make only an indifferent surveyor.

As regards the Institute, it may be, as you say, impossible for it to get rid of the surveyors within its ranks. I think it is. But at the same time this is a confession that, on its present lines, the Institute is not what it claims to be, a body of architects, and nothing but architects; and the five letters which denote membership, by this showing, only mean necessarily that he who owns them did at one time so far engage in architecture as to satisfy the very comprehensive conditions of the Charter. What then becomes of that protection which these five letters are supposed to afford to the confiding public?

T. G. JACKSON.

SIR,—In architecture, art and science are inseparable (as you very aptly illustrated in your reference to Peterborough last week). The two elements are so spun together into one thread that to remove either is to destroy the whole. Young men entering on a career may be materially helped by an organised system of teaching. Even the "little common sense" can be arranged and packed into the brain in a more accessible way with the aid of a teacher than without it; while the inherent art faculties of a youth, be they great or small, may be developed by good models and illustrations. It is true we cannot *make* a silkworm, but we can take care that the young grub is fed on mulberry-leaves as soon as it creeps out of the egg. It is perfectly idle to argue that a thorough system of education would prevent men of superior fibre from coming to the front. Occasionally, such a one may "ignore system" and survive, but to commend this example to the average youth is most pernicious teaching.

The Institute have thought fit to adopt an examination fence, which they are perfectly justified in doing, although, at the same time, examination without tuition is not a thing to be approved of in the abstract. Yet, the step is so decidedly in the right direction that it should be accepted frankly, and the next step at once demanded,—namely, tuition. The Association, with the characteristic youthfulness of that evergreen body, have rushed into the gap, and exhibit the most commendable zeal in so doing,—but the field is wide, and London is not the whole Kingdom.

It is obvious architecture demands better educational advantages than it now possesses,—that its equipments should be at least equal to those of the other professions,—and that it should be placed with them on an equal footing in the great University centres of the country. The University authorities have the means and the opportunity to do a great deal for architecture if properly directed, and the needs of the profession properly put before them. While the Institute is not qualified to become a teaching body, it is fully competent to direct the training of the younger members of the profession. It could, with the voice of authority, point out to the Universities what is required and the form it should take, and with their aid organise a general system of education for the whole country, and for the future exercise a supervising influence, seeing that the right materials were used in spinning the thread, otherwise it is possible the scientists may step in and try a new combination.

ARTHUR HILL,
Lecturer on Architecture.
Queen's College, Cork.

SIR,—As you were good enough to insert my letter last week, you will, I trust, allow me to finish my story.

I have told you of the benefits received from the Institute examination in the form of incentive and guidance. Let me tell you further of the tangible results. I commenced practice. I had no influence, no means. It would have been a hard struggle at first as an architect pure and simple in a provincial town, so I studied "quantities" and "surveying." These proved invaluable aids to myself, and of great service to my clients. When a client once found me out he stuck like a limpet to a rock. Financially, I prospered.

But what of architecture? I do not deny that, had I bestowed all my strength on the artistic side of my work, capacity as a designer would have been increased. Such capacity, however, was not in demand. I had a wife and family to support, and others looked to me for help. I had the instinct of an artist, and nothing could rob me of it. My little works, if simple, are truthful; others say, "they are well-proportioned, dignified, and pleasing." Add to this, that I knew about every quantity, could tell of every "extra" and every deduction; that adjustment of accounts was consequently easy, that my clients' interests were conserved, and strict justice meted out to my contractors.

My work may increase so as to prevent this careful management of every detail; of that I do not concern myself. I would almost rather it did not; but if it does, then I must drop my "crutches" and soar to higher flights. I am still young.

Now, I should not have troubled you with further writing, had it not been to say what follows. If "the memorialists" do not see their way to join the Institute, and to help by precept and example to purify and better it, it is a matter which concerns themselves. Nothing shall prevent me supporting it, or make me afraid to join with any man doing honourable work. I say with confidence, Prepare for this examination. It is the way to success. The youth without guidance wanders aimlessly on, gets befogged, and often turns aside from all earnest effort. The Institute has marked out the path, you know that your perseverance and energy are rightly directed, and, working along the way with vigour and intelligence, you are certain of prosperity. You will also find that the stimulus given will grow with what it feeds upon, and that you will acquire noble lessons by the wayside.

Do the work that comes ready to your hand with your whole strength and soul. The fittest survive. Leave the immutable laws of nature to set everything in its due place.

EPICTETUS.

December 28, 1891.

ALL SAINTS' CHURCH, HERTFORD.

SIR,—This, the last building in Hertford possessing any remains of antiquity, was burnt down on Monday, December 21, at five a.m. Two of the other five churches were pulled down in the sixteenth century, and St. John's about a century ago, and St. Andrew's was rebuilt gradually about 1870-75. The spires of the town could be seen distinctly from Finsbury-park, a distance of sixteen miles.

The original building consisted of a nave, chancel and transept, and west tower. There was no clear-story, and the nave was lighted by common domestic dormers.

The old portion appeared to have been built in the twelfth century, and had plain one-light lancet windows, and probably resembled Minster Church, near Margate. The tower formerly had a Decorated west window; the last remains of its tracery was removed in 1839 and restored in 1857. The south aisle was added about the time that the churches of St. Mary and St. Nicholas were pulled down. It is of unusual width, 32 ft., or nearly half as wide again as the nave. The north aisle was a stuccoed Gothic structure of the early part of the present century. The chancel aisle on the same side, built about 1875, was designed to match it in materials and style. The three lancet lights at the east end have been replaced quite recently by a three-light window. The east buttresses, the only part not concealed by stucco, contained a considerable quantity of Roman

bricks. The leaded spire, about 40 ft. high, replaced one of double that height removed early in the present century. The churchyard is planted around all sides with a double row of large chestnut trees, as is the cemetery adjoining on the south side, which is simply an extension of the churchyard. These burial-grounds together make up about the finest churchyard in England.

WALTER SCARGILL.

Colchester, December 26.

ROOD-SCREENS.

SIR,—"W. S. B. H." will find the rood-screen of Cullompton, Devon, fully illustrated, in the third volume of "Transactions of Devon and Exeter Architectural Society." G. B. P.

Dec. 28, 1891.

SIR,—A correspondent in last week's *Builder* mentions the famous Caroline screen at Wiggenhall, St. Mary the Virgin. I fear it has been removed within the last five years. And it was doubly interesting, from its date, 1626, and also from its being erected just west of the mediæval screen, which had been cut down to the stall level, so common in Norfolk.

There has been a correspondence lately on vandalism at Totnes Grammar School. And there, too, the great rood-loft in St. Mary's Church has been destroyed within the last three years. This was some 14 ft. wide, covering the first bay of chancel, the staircase being at the north-east corner; and had a stone screen west, and an oak one east. Meantime a hideous north gallery remains.

Perhaps the vicars of Wiggenhall, St. Mary the Virgin, and Totnes would explain. VIATOR.

Oxford and Cambridge Club, December, 29, 1891.

*** We understand that photographs of the rood-screens of Devonshire and Cornwall can be obtained from J. B. Worth & Co., Cathedral-yard, Exeter. It may be a convenience to correspondents who are interested in the subject to know this.

The Student's Column.

WARMING BUILDINGS BY HOT WATER.

I.

INTRODUCTION.

THE purposes to which hot-water heating works may be put are both many and varied, but in dealing with methods, and the different forms of apparatus, it will be best to treat them under three distinct headings,—viz., horticultural works, building works, and works in which the heating is done by hot air alone. In the latter case the air is heated by pipes in a chamber specially provided, and differs from the two former methods by the absence of direct radiated heat.

From exposed pipes the heat is felt in two ways,—firstly, by direct radiation from the surface of the metal, that is, heat projected from the metal and being so transferred to surrounding objects; this warmth does not heat the air. Secondly, by the air being heated by contact with the pipes, which air instantly leaves the pipes and makes room for more air to come in contact and be heated, and so on. This is termed Convection,—*i.e.*, heat absorbed and conveyed by the circulatory action of air The difference between the two first and the third method mentioned is, therefore, that the former contribute heat by radiation and convection; the latter by convection only.

The object in treating these three purposes to which hot-water works are put separately, is that both the pipes and appliances generally differ to a considerable extent, and the actual phenomenon of circulation requires considering in different ways in each case. Before, however, proceeding with the description and examples of the work under discussion, it becomes necessary to say a word as to the manner in which heat operates.

Of course many readers may be conversant with the laws of heat, and, for the sake of those having this knowledge, we treat the subject as briefly as possible; but, on the other hand, so many following this calling have but imperfect ideas in this direction, that some description is really essential. No one erecting an apparatus can be certain as to the results it will give, unless the ways in which heat manifests itself are known to him. It is not sufficient that a man knows the principle of circulation of water only, as this deals with the action of the fluid by itself, and a hot-water apparatus, although it may be extensive, well constructed, and having a perfect circulation of hot water within it, is of no use whatever unless it freely parts with its heat and distributes it where required.

Heat.—Heat transmits or manifests itself to us in three different ways,—viz., by conduction, by radiation, and by convection. All these modes of action exist in connexion with every hot-water apparatus that is erected, and when once the principles are understood, it can be readily seen what description of apparatus is most suited for certain purposes and under certain conditions. There are other manifestations of heat, such as absorption, diffusivity, &c., which will be alluded to in due course. It is not proposed to deal with the theory of heat, as it does not come within the province of these papers; the action of heat, however, is all-important.

Conduction of Heat.—This is the way in which heat is transferred through or about a body. Every substance possesses this power of conduction to some degree, although there are many substances which are exceedingly slow in their action, and are frequently, though erroneously, termed non-conductors. It is in solids that we get the conductive power chiefly, metals in particular being mostly conductors of a very rapid character. In fluids, gases and liquids, the action is principally noticeable by its absence; but in these we get another more useful action, viz., convection, without which a hot-water apparatus, in its present form, would be a very useless contrivance.

It will be found in later papers that poor conductors of heat answer a very useful part in these works, when it is wanted to conserve the heat and prevent its loss. This happens when pipes have to be carried in very exposed places where the heat is not required, or wherever a waste of heat may occur.

For the purpose of these papers we have only to deal with the conductive properties of iron, this being, practically without exception, the only metal used in hot-water-heating work. If copper is ever used we may be content with the knowledge that it acts even better than iron. The following table shows the comparative conductive properties of various substances, and it will be noticed that iron, particularly that which is cast, stands high, and it possesses the important advantages of being inexpensive and durable. It has to be mentioned that there are several tables of conductivity compiled by different authors upon heat, and they vary considerably in the comparative powers of substances, but the materials in all the tables follow the same order as to precedence:—

COMPARATIVE CONDUCTIVE POWERS OF SUBSTANCES as given by M. Despretz:—

Silver	97·30
Copper	89·82
Brass	75·20
Cast iron	56·90
Wrought iron	37·43
Lead	17·96
Marble	2·36
Firebrick	1·14
Water	0·90

We shall have to refer to silicate cotton presently, when speaking of its low conductive properties. This material stands very much lower than the lowest figure upon the above table.

Although water is such a poor conductor, it stands high as an absorbent of heat. This peculiar property has to be considered, as some substances seem positively averse to heat in every way, which is, fortunately for these works, not the case with water. Those substances which absorb heat readily, also part with it freely; this water does in a very satisfactory method, and it may therefore be looked upon as the medium by which the heat is collected and conveyed to the points required; collecting it rapidly and diffusing it just as quickly where it has opportunity. It seems a drawback that water should have to be confined in pipes, as under the best of circumstances some of its good qualities are thereby lessened, sometimes lost.

As just mentioned, conduction, in these papers, has only to be considered as regards iron, that is, the boiler-plates and the substance of the hot-water pipes or radiating media. It does not apply to the fire which is around the boiler nor the water that is within it, but only to the materials that separate the fire from the water, and the water from the air, respectively. There are, however, other necessary features to be observed, particularly the radiative power of the surface of the pipes, &c. For instance, if we had silver pipes, the conduction of the heat would be nearly twice as rapid as with iron, but, by referring to the table of radiating powers in the next paper, it will be found that although the heat is brought to be surface of the pipes, it would be very loath to dissipate, and the ultimate result might be worse than with iron pipe if precautions were not taken.

In concluding this brief explanation of "Conductivity," attention may be called to a peculiar property closely connected with the same subject, which has very correctly been termed "Diffusivity." Doubtless, all readers have seen "gilled" pipes, as figs. 1 and 2, and

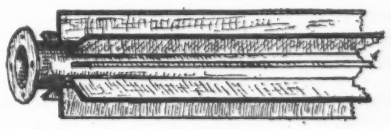


FIG. 1.

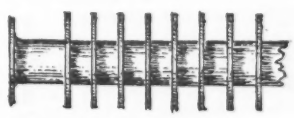


FIG. 2.

have also heard of or seen "Gill stoves," which are largely used, especially in public buildings. (The gills are a number of plates extending from the body of the stove, which is ribbed, so to speak.) It may not, however, be known to all what special use these gills fulfil. If we take a hot-water pipe and charge it with water at a temperature of say 200 degrees, the heat of the outer surface will bear a close relation to these figures. If, however, we add a number of gills to the pipe, as figs. 1 and 2, some of the heat will transport itself into these plates until the whole of the metal becomes of a fairly uniform heat, but it will be found that this heat no longer bears such a close relation to the 200 deg. In other words, we have the same quantity of heat distributed over a larger area, which reduces its quality, as we may say; a larger volume of heat at a lower temperature. We might almost liken the heat to an odour, which does not become lost, but weakened, as it spreads about. The utility of this heat diffusion is that we get an equal value of heat at less temperature in greater volume. The aggregate is the same, but a more agreeable result is effected by the greater distribution of heat thus brought about by the increased radiating surface, and, instead of being insufferably hot near the coil and cooler elsewhere, we may look for a more equalised temperature all around.

With hot-water pipes this result is, however, not noticed to the extent, nor is such a gain effected, as when the gills are applied to stoves. They are, then, a decided advantage, and there is hardly a stove-maker who does not make use of them in one way or another. Stoves that are in exposed places, are thus rendered practically safe should any one lean against or come in contact with them.

Radiation of Heat.—This is the term used to express the way in which heat is projected or diffused from the surfaces of heated substances. Projected is a better word than diffused, as radiant heat travels in direct lines from the source of heat. Although just within a certain radius around the heated object the heat appears to be general and equal in all directions, we find that immediately a screen or anything is interposed between us and the source of heat, we at that same instant discover that radiant heat is not diffused in a literal sense. It is not diffused like an odour.

Radiant heat distributes itself in a measure, its area becoming enlarged as the distance from the heated body increases, in the same way as can be noticed with a projected beam of light; but for the warmth that we experience behind or upon the opposite side of objects that may be opposite a source of radiant heat we must look for a different cause. It is the re-radiation of heat and heated air that is accountable for this,—objects that have received heat redistributing it; and the air is heated by contact with these objects, and also by contact with the original radiating medium (assuming it is not an open fire). The air which is heated (that is, heated by contact with heated surfaces only) is distributed here, there, and everywhere by its property of convection, and screens and obstacles of a like character do not materially interfere with this means of heat distribution, as will be explained in the next paper.

A common example used to show that radiant heat does not heat the atmosphere, is to refer to the sun, which transmits heat to the earth by radiation, but leaving the outer or upper portion of the atmosphere, through which its heat has to pass before reaching the earth, in a state so devoid of heat as to cause death to æronauts unless the utmost precautions be taken. The sun may be shining brightly all the time, and the heat at the earth very great.

OBITUARY.

MR. WILLIAM SMITH.—The death is announced of Mr. William Smith, City Architect of Aberdeen. According to the *Times*, Mr. Smith was born in 1817, and was educated at Marischal College, Aberdeen, where he graduated M.A. After travelling in Greece and Italy for the purpose of perfecting himselt in his profession, he returned to Aberdeen in 1842, and ten years later succeeded his father as City Architect, an appointment which he held until his death. He erected many of the churches and public buildings in Aberdeen. When her Majesty and the Prince Consort determined upon erecting a new castle in the Highlands, Mr. Smith was chosen to design the building and to superintend its erection, and Balmoral was the result. Mr. Smith erected many other private mansions, schools, hospitals, &c., in various parts of Scotland.

MR. JOHN SHILLITOE.—The death is announced of Mr. John Shillitoe, contractor, of Bury St. Edmunds, in his fifty-ninth year. The son of a builder, and descended, it is stated, from a line of builders which can be clearly traced back for a period of three hundred years, he was born at Campsall, near Doncaster, in 1833. In 1867 he commenced business at Campsall with his brother-in-law, the style of the firm being "Shillitoe & Morgan." After residing for a time at Birmingham, Norwood, and other places, he removed in 1885 to Bury St. Edmunds. In the previous year he had taken his only son, Mr. Thomas Shillitoe, into partnership, the style of the firm becoming "Shillitoe & Son." He built and restored a large number of churches, and erected Truro Cathedral, the new King's Weighhouse Congregational Chapel, Grosvenor-square, the additions to Westminster Hall, and many other important works. At the time of his death, amongst other works he had in hand is the new National Portrait Gallery in Charing-cross-road, adjoining the National Gallery. He was much respected by his employés, and was a Town Councillor of Bury St. Edmunds.

MR. WILLIAM WILKINSON. — We regret to announce the death of Mr. William Wilkinson, head of the firm of Messrs. B. Cooke & Co., of Phœnix Wharf, Battersea. The deceased was well known in the railway and contracting world. The early part of his career was spent on works in connexion with the Great Northern Railway, he having spent nine years as Resident Engineer on the Yorkshire district of that line. In 1872 he resigned this responsibility and joined the late Mr. Benjamin Cooke, and together they established the now well-known business at Battersea. The deceased was sixty-seven years of age, and will be interred at Wimbledon Cemetery this Saturday, January 2. He is succeeded in the business by his only son, who has been intimately connected with all contracts since 1875.

THE LATE MR. JOHN RÜNTZ.—We regret to record the death of Mr. John Rüntz, which took place at his residence, Linton Lodge, Stoke Newington, on the 19th ult., after a short illness. Mr. Rüntz was for twenty-one years an energetic member of the Metropolitan Board of Works, and accomplished much useful work. He was mainly instrumental in introducing the sanitary clauses into the Metropolitan Building Amendment Act, having gained considerable experience as chairman of the Hackney Board of Guardians during the last cholera visitation. He was keenly alive to the necessity of improving the thoroughfares of London, and the minutes of the Metropolitan Board can testify to the knowledge and activity he brought to bear in the numerous committees upon which he served. One of his favourite schemes was a 100 ft. thoroughfare from Somerset House in a direct line to the British Museum, this scheme, somewhat modified, has recently been under the consideration of the London County Council. It was he who promoted the Bill for the Freedom of the Metropolitan Bridges over the Thames and Lea, in conjunction with Sir William McArthur, which Bill afterwards became law, the freedom sought being acquired with the revenue of the Coal and Wine Dues. Mr. Rüntz was, perhaps, best known for the active part he took in securing open spaces for the public,—Hackney Downs, Mill Hill Fields, Newington Green, Finsbury Park, and later, in conjunction with the late Mr. Joseph Beck, the acquisition of Clissold Park, by far the finest park in the north of London.

LONG-DISTANCE TELEPHONING.—The other Sunday a person at Cederslund, in Northern Sweden, was enabled to converse with another at Lund, in the extreme south, a distance of nearly 800 miles. The words were perfectly clear.

GENERAL BUILDING NEWS.

BISHOPSGATE GIRLS' SCHOOL, CHAPEL, AND RESIDENCE. — These new buildings, situate in Spital-square, Bishopsgate-street, were recently opened by the Right Hon. G. J. Goschen. They have been erected on the south side of Spital-square, to replace the school buildings formerly situated in Skinner-street and Primrose-street, Bishopsgate, these premises having been acquired by the Great Eastern Railway Company for the widening of their line. The buildings, consisting of the schools, chapel, and curate's residence, are grouped more or less on three sides of the open playground, which is entered by wrought-iron gates, and has a tar-paved surface. The new school buildings have been designed to accommodate 550 pupils, and are planned to meet all the requirements of a modern middle-class girls' school. The school building is approached across the playground, being set back from Spital-square, thus giving more quiet for the work of the teachers. The school building contains three principal floors, as follows:—On the ground floor one enters a hall with a wide corridor running parallel to the length of the building, and off which are placed the class-rooms for the younger children, also the head and assistant mistresses' rooms and the committee-room, and running along the east side of the building is the large dining-hall, measuring 55 ft. by 25 ft., which is divided from the kitchen department by a serving-room. On the first floor are a series of class-rooms, varying in size, certain rooms being able to be thrown together, but all easily controlled and supervised by glazed pass-doors. On the second floor are the art and drawing class-rooms, the cookery kitchen, further general class-rooms; and in the east wing are a series of small and distinct music-rooms for practice, with a music library, &c. Each floor has ample cloak-room accommodation, with drinking fountains provided in the corridors. The double staircases of a fireproof character (without winders), so as to allow of the up and down traffic being kept separate, form a good feature in the plan. The kitchen department is severed by fireproof iron doors, and contains all the necessary offices for cooking and taking charge of the premises. Special care, we are informed, has been taken with the ventilation and the drainage of the buildings. The heating is by means of open stoves, which emit warm fresh air into the class-rooms, and these are aided in the corridors and larger rooms with a low-pressure hot-water system, so as to keep the building throughout at an even temperature in cold weather. The range of latrines is placed in the rear and outside the main building, having a direct access to the outer air. Externally the building has been erected in red bricks with buff terra-cotta dressings and enrichments, the style of architecture being based on collegiate buildings of the Jacobean period. Adjacent to the school, a chapel has been erected, with accommodation for upwards of 500 persons. This chapel, which is intended to be used for lectures, concerts, and other purposes, is 63 ft. long by 44 ft. broad and 34 ft. high, is largely lit by mullioned windows, and has a panelled wooden ceiling with coved sides, the main body of the building being divided from the aisle by polished granite columns. At the north end of the chapel a platform has been erected, and at the side the organ has been placed. The entrance is direct from Spital-square with a lobby, and there is also a further entrance from the schools at the rear. Adjoining the chapel and communicating therewith is a residence of three floors, with basement and attics in addition. Each of the principal floors contains a complete set of rooms, consisting of sitting, bed, and bath-rooms. The whole of the buildings have been designed by and carried out under the immediate supervision of the architects, Messrs. T. Chatfeild Clarke & Son, Messrs. Woodward & Co., of Wilson-street, Finsbury, being the contractors. The cost of the buildings has been about 18,000*l.*, which is exclusive of the value of the land.

RESTORATION OF WIMBORNE MINSTER.—On the 21st ult. an opening service was held in Wimborne Minster, which has just been restored. At a vestry meeting held in November, 1890, Mr. Pearson was appointed architect, and Mr. Fletcher was asked to act in conjunction with him in carrying out the work. The tender of Messrs. Merrick & Son, of Glastonbury, for the sum of 1,689*l.*, was accepted, and the work was commenced in May. Through the kindness of Mr. Walter Fletcher, who has been in charge of the work, we (*Dorset County Chronicle*) are able to give the following particulars of the principal work and the discoveries made:—The walls of the transepts have been raised about 2 ft., and thoroughly repaired. The dressed stone work, which was principally of Tisbury stone, and very much perished, has been renewed with Doulting stone from Shepton Mallet. The roofs have been entirely reconstructed with good English oak, and raised to the original height of the short transept roof, as they existed in the Norman period. On the removal of the roof and timbers of the north transepts the original line of the roof, as it was first constructed, was clearly to be seen where it abutted against the south side of the Norman staircase turret which in those days flanked the north-west angle of this transept. Why the fourteenth-century builders lowered the pitch of the transept roofs seems a mystery. Another peculiarity is that the angles of the water tables on the north side of the lantern-tower do not correspond with regard to their rake, that on the east side being 9 in. wider than that on the west. The length of wall between the lantern-tower and the Norman turret on the west side of the north transept was found to be nearly 10 in. less in thickness than the rest of the walls. This difficulty has been surmounted by keeping the wall-plate at a higher level, which also gives additional head to the gangway leading from the turret to the triforium. On removing the thick plaster from the walls of the north transepts it was clearly seen various alterations had taken place from time to time. The masonry was finished with a rather rough face, which had been whitewashed over. A very thin coat of plaster had been added at some subsequent date, and various coats of white and colour had been placed on this, then a thick coat of plaster or stucco, which was the finish when the restoration was commenced. This has now been entirely removed, and a very thin coat of plaster put on the walls. It was also proved that the outside faces of the walls in the Norman period were covered with rough-cast, as the wall on the north side of the Norman turret was not bonded in on every course when the new wall near the transept was lengthened in the fourteenth century, and the rough-cast had not been removed where it was not bonded. Another curious feature was that the stone string-course, which finished the wall, in the wall-plate was cut through at regular intervals about 11 in. apart and 4½ in. wide, as if the roof had been constructed with wall pieces coming below the string-course. These intervals had all been carefully filled up with stone-work. An altar recess has been discovered in the east wall of the north transept. The recess was originally 6 ft. 2 in. wide, and with a semi-circular Norman arch impost moulding on the north side corresponding in detail and situation with the impost moulding that remains in the north face of the north-west pier of the lantern-tower. When the archway between the north chancel aisle in the north transept was also enlarged, probably in the fourteenth century (late), this altar recess was found to be in the way. The recess appears to have been reduced on the south side as much as possible, so as not to interfere with the altar and the arch on that side. The wall at this place has for some years shown signs of considerable movement, which is not to be very much wondered at, for the pier which remained to take all the weight of the superstructure was only about 10 in. thick. Added to this, it appears that when the gallery in this transept was constructed, early in the present century, it was approached by a staircase from the chancel aisle, and in forming a doorway at the top of the staircase the builders cut right through the centre of the arch of this altar recess. On removing the rough stone wall with which the recess was filled some very interesting frescoes were discovered. There appear to have been no less than three subjects painted on the inside wall at various times. The uppermost one represented the Holy Rood. The cross springs from the base of the carved stone-work to form a bracket which has at one time formed part of a shrine, and a piece of the same stone-work is walled in a little to the north under the figure of the Virgin Mother to form a small bracket. Since the recess has been discovered the upper fresco has in places fallen off, disclosing the figure of a Saint, evidently of a much earlier date, and also an Agnus Dei over the head of St. John. The Holy Rood fresco must have been in its present position when the alterations in the archway between the chancel aisle and the transept were made, as they are not in the centre of the recess as it now exists. There are also indications of a third fresco, probably of a still earlier date, in several places. The stone altar has been restored, a line in the plaster showing its exact dimensions, and the defective pier rebuilt. The piscina, with corbel shelf over it, probably to take the figure which was found walled in the filling up of the recess, has now been placed on the north side, as there was not sufficient room, owing to the pier, to refix it in its original position on the south side. It might have belonged to another altar, as tradition assigns to this transept the site of Thomas de Brembre's chantry. The whole of the tracery of the west window of the transept has been restored, almost every vestige of it having been destroyed or removed. The wooden gallery, which rested on the tie-beams of the old roof, and formed the only means of access to the lantern-tower from the Norman turret, has been replaced with a handsome stone gangway, supported by a massive moulded arch, extending from turret to the lantern-tower, and finished with an iron railing. The north window is now being filled with stained-glass, the subject being the Te Deum. The window of the east side of the transept is a representation of the Nunc Dimittis. The window on the west side represents the Magnificat. The glass of these windows has been executed by Messrs. Clayton & Bell. The works in the south transept are somewhat similar to those in the north. The walls have been raised, and a new English oak roof of similar design restored to its original pitch and height. The remains of a single-light window were found in the east wall at the south end of this transept. The stone-work of this

has been restored as far as possible, but as the vestry and library over it project beyond the line of the opening, it cannot be used for its original purpose. It appears to have at one time contained the stairs leading to the chamber over the vestry, now called the library, as it is purely circular on plan, and the remains of the steps were found. The altar recess, occupying a similar position to the one in the north transept, has also been restored. The arch had been cut through when the gallery was found as in the north transept. The south window is to be filled in with stained-glass by Messrs. Powell & Sons, to the memory of the late Mr. William Druitt. It is the gift of his children, to whose generosity the cost of the repairs in the south transept is due. The repairs still remaining to be done are the making good of the masonry of the walls of the main aisles. Besides these alterations the heating apparatus of the church has been renewed, and an oak screen placed to shelter the western door.

HOSPITAL EXTENSIONS, WOLVERHAMPTON.—Extensions to the Borough Infectious Hospital, Greenlane, Wolverhampton, comprising an entrance-lodge, additions to the administrative block, and a hospital pavilion, were opened on the 23rd ult. by Alderman J. C. Major (Chairman of the Sanitary Committee of the Town Council). The pavilion is designed to accommodate eighteen beds; and has two main wards, each for eight beds, a nurse's duty-room, and two single-bed wards, with bath-rooms for each ward, and other arrangements. The additions to the administrative block include doctors' or committee room, with dispensary and other conveniences, nurses' dining-room, eight bed-rooms, bath-room, and other apartments. The building has been carried out by Mr. A. Lovatt, his contract price being 3,604*l.* The designs for the buildings were drawn up by the Borough Surveyor (Mr. R. E. W. Berrington), with the assistance of the Medical Officer (Dr. Malet), and the suggestions of the Sanitary Committee and its Chairman.

NEW BATHS, SALISBURY.—These baths have just been completed for the Salisbury Swimming Baths, Ltd. The site chosen is in Rolleston-street, and the building is about 94 ft. long by 50 ft. wide, with slipper-baths adjoining. The roof consists of iron principals, with lantern ventilators, and is covered partly with slates and partly with glass. The bath itself is 80 ft. long by 34 ft. wide, lined with glazed bricks, and the water is procured from a well sunk on the premises, and warmed by steam injection to a temperature of 75° Fahr. A gallery runs along the two sides and one end of the building, under which the dressing-boxes are arranged, accommodation being provided for forty-one bathers. These dressing-boxes, as also the building, are warmed by steam-pipes. In connexion with the swimming-baths, and fronting on Church-street, a steam laundry has been erected, fitted with every modern improvement, and capable of turning out 60*l.* of work weekly. The hot water for baths and laundry is supplied by a 20-ft. Cornish boiler. The total cost of the laundry and baths, exclusive of the site, was about 4,500*l.* All machinery, pumps, laundry plant, &c., were supplied by Messrs. Thos. Bradford & Co., of London. The ironwork was supplied by the Redcliffe Crown Galvanised Iron Co., Bristol. The roofs were glazed by Messrs. Rendle & Co., of Westminster, on their patent "Acme" system. The contractor for the building was Mr. John Wort, of Salisbury; and the building was designed and carried out by Mr. Alfred C. Bothams, A.M. Inst. C.E., architect, of Salisbury.

FOREIGN AND COLONIAL.

BERLIN.—A competition has been opened for the design for an equestrian statue to the late Emperor Frederick III., to be placed on the battle-field of Woerth, in the Alsace, on which field he distinguished himself in the Franco-German war. Ten thousand pounds are at the disposal of the committee in charge of the erection. The statue is to be of cast bronze, and is to stand on a pediment of some 3 to 4 mètres high. The pediment is to receive decoration in the form of bronze figures representing the companionship in arms of North and South Germany against France. The designs (models of some size) are to be sent in by April next, and will be assessed by a jury of four sculptors and a painter. Four prizes (of 200*l.* each) are to be given.——The competition for the design of the equestrian statue of the late Emperor William I., to be placed in a central position on the memorial monument in course of erection on the Kyffhäuser, has been decided. The first prize has fallen to the sculptor, E. Hundriesser (Charlottenburg). The number of competitors was thirty-eight, and four prizes were awarded. The average quality of the designs sent in was poor, quite two-thirds of the number having no artistic value whatever. The selection of Herr Hundriesser's design for the first prize meets with the approval of those who have seen the work sent in. It will be remembered that the Kyffhäuser monument is one of those large memorial piles in course of erection under the superintendence of the architect, Bruno Schmitz.——The competition for the large Government Travelling Studentship of Architecture by the Prussian Academy of Arts every two years has this time again been a farce, only three architects applying for it, and of these three (who had passed the preliminary examination required of them) only one of them entering for the competition proper. The studentship was given to this one candidate, although his work was not considered very satisfactory. His name is Hartmann (Stettin). The country he will be expected to travel in is Italy. The value of the studentship is 150*l.* a year for two years, together with 30*l.* extra for railway expenses.——Some activity apparently prevails in matters relating to the erection of some new buildings for the Prussian Upper and Lower Houses, referred to in a former number. The designs to be carried out are now settled: 10,000*l.* have been put at the disposal of the architect, "Baurath" F. Schulze, and the office at the works will be opened on the 15th inst. One of the two buildings will be commenced this year, but the other cannot be commenced for some years, the site on which it is to be placed being at present occupied by the premises of the Imperial Reichstag, which body will not vacate them until their new palace on the Koenigsplatz is complete.——The "programme" of the *salon*, to be held this year under the auspices of the Prussian Royal Academy of Arts, has been published, and from it we learn that there will at last be a stop put to artists exhibiting an unlimited number of works of art of the same class, as has been their wont on former occasions. Artists, as a rule, will not be permitted to exhibit more than three objects of the same class. Only a limited number of well-known men will be invited to exhibit more than three; and then, if possible, they are to exhibit a full collection of their best pieces of work, to be hung separately.——There is some talk of the Municipality of Berlin erecting a museum for modern sculpture, a bequest for this purpose having, apparently, been left to the city.——Some new regulations have been published relating to the erection of new buildings in the outer suburbs (independent villages as yet, lying outside the boundaries of the city). They are very stringent, and are causing much dissatisfaction.

MUNICH.—Herr Wilhelm Rettig has been elected to hold the post of City Architect, vacant since the death of Herr Zenetti. Herr Rettig, who will have the title of an "Ober-Baurath," made a name at the time of the great competition for the memorial monument to the deceased Emperor William I., at which he gained the first prize for a design made together with Herr Pfann. Since the year of this competition he has for some time been City Architect at Dresden, which post he had, however, to resign on account of a controversy with the authorities.

SWEDEN.—The Stockholm Building Association has just held its annual meeting, when all its officials were re-elected, the President being Herr C. A. Olsson, master builder, and the Secretary, Herr C. A. Flodguist, architect. A handsome building has just been completed at Gothenburg for the Gothenburg Bank of Commerce. The style is Florentine. The lower part of the façade is of roughly-hewn Swedish granite, whilst for the upper portion pressed Swedish cement has been employed. The architects are Messrs. K. Johansson & V. von Jegerfelt.——The Gothenburg and Bohus Län's Sparbank has been rebuilt by Herr Hj. Cornilsen, architect.——The agent of the Swedish Export Association writes from Argentina that the import of timber villas from Sweden has almost entirely ceased owing to the high premium on gold and the low prices of bricks and wages, houses of stone being therefore as cheap. Owing to the low value of the notes in which wages are paid labour is as cheap as in Sweden. Several planing and carpentering factories have stopped from want of work.

SANITARY AND ENGINEERING NEWS.

POOLE SEWERAGE SCHEME.—The Corporation of Poole, Dorset, have recently instructed their Borough Surveyor to proceed with the scheme of drainage designed by Mr. Lewis Angell in 1885, estimated to cost about 30,000*l.*, and appointed Mr. Angell to act as consulting engineer therein; but in consequence of other official engagements, Mr. Angell has now been compelled to resign the position, at which the Council "express their regret," and have appointed Mr. James Lemon, C.E., Mayor of Southampton, in place of Mr. Angell.

SEWERAGE AND SEWAGE DISPOSAL OF KNARESBOROUGH (YORKSHIRE).—At a recent meeting of the Knaresborough Improvement Commissioners and Local Board of Health, Mr. D. Balfour, M.Inst.C.E., of Newcastle-on-Tyne, submitted report, estimate, and plans for a scheme of main sewerage and sewage disposal for the town, estimated to cost in execution 7,000*l.*, the sewage being disposed of on land. After the scheme, with plans, &c., had been thoroughly gone into by the Board, it was agreed to adopt the scheme as submitted, in preference to any chemical process of disposal, there being ample suitable land in the district available. The engineer was instructed to submit the plans to the Local Government Board for sanction to obtain the necessary loan for the works. A Provisional Order has already been obtained for the land purchase.

MISCELLANEOUS.

CARPENTERS' COMPANY'S PRIZES, KING'S COLLEGE.—On the 17th ult., the prizes given by the Carpenters' Company to the students of technical classes at King's College were distributed by Mr. Henry Harben, L.C.C., the Master and many of the past-Masters of the Carpenters' Company, Dr. Henry Wace, the Principal of the College, and many of the Professors being present. There were many members of the British Institute of Wood-Carvers at work in the wood-carving room, and there were microscopes in Professor Groves's room showing specimens of wood and stone. Lime-light views of the various styles of architecture were given in the drawing-room, with explanatory notes by Prof. Banister Fletcher. A fine collection of wood-carvings belonging to Mr. Rogers, and diagrams and instruments, were explained in the new Electrical Laboratory. The students' drawings were hung on the walls, and photographs, &c., in the Reference Museum and Architectural Corridor. The following is the list of prizes awarded:—*Building Construction and Architecture: (Day Classes): Second Year*:—A. E. Mullins, prize of 5*l.* and silver medal; H. P. Fletcher, 3*l.* and bronze medal; H. G. Leslie, 2*l.*; J. Howard and T. H. Coad, Certificates of Approval. *First Year*:—H. T. Adlard, prize of 5*l.* and silver medal; A. T. Angell, 3*l.* and bronze medal; E. C. Monson, 2*l.*; T. A. Watson, Certificate of Distinction: H. Alberry, R. C. Master, and H. C. Trimnell, Certificates of Approval. *Evening Classes*:—J. Goddard, prize of 5*l.* and silver medal; C. M. Cobb, 3*l.* and bronze medal; E. C. Monson, 2*l.*; W. H. Lord, 2*l.*; J. Little, 1*l.*; J. Almond, 1*l.* 10s.; A. G. Hubble, 1*l.*; H. S. Cregeen, T. J. Barrett, A. S. Brighty, and F. H. Pearse, Certificates of Approval. *Architectural Drawing*:—W. H. Lord and T. J. Barrett, bracketted equal, prizes of 2*l.* each; W. G. Pritchard, prize of 1*l.*; C. M. Cobb and H. S. Cregeen, Certificates of Approval. *Wood Carving*: *Evening Classes*:—L. Aston, prize of 3*l.*; W. Watson, 3*l.*; C. M. Cobb, 1*l.* *Day Classes*:—C. G. Money, prize of 5*l.*; G. Stevens, 3*l.*; E. R. Hine, 3*l.*; F. Bevan, 1*l.*; and J. Wicks, 1*l.* *Ladies' Classes*:—L. Travers, prize of 2*l.*; and J. Stapleton, 1*l.*

THE MOVEMENT FOR NATIONAL REGISTRATION OF PLUMBERS.—A meeting of the Forfar, Perth, and Fife District Council of the National Registration of Plumbers was held on the 22nd ult. in the Burgh Court-room, Dundee. Lord Provost Mathewson presided, and there were present Dr. David Lennox, Dundee; Councillor Davidson, Perth; Councillor Smart, Perth; Mr. John Wood, Montrose; Mr. Thomas Kinnear, Dundee; Mr. P. Lorimer, Broughty Ferry; Mr. J. L. Warden, teacher of plumbing class, Montrose; Mr. J. J. Henderson, local secretary; Mr. W. Farquharson, local treasurer, &c. After the preliminary business, the Lord Provost said he felt that it was most important that every tradesman should have a scientific knowledge of the work to which he had devoted himself; but, above all, that plumbers should have a thorough scientific knowledge, so that they might, in every detail, understand their business. The plumbing trade affected not only the men employed, but the community at large to an extent that few trades did. In Dundee there was no excuse for any young man not having a proper scientific knowledge of his trade, for in the city there were the Technical Institute and the University College, both of which were splendidly equipped, and were doing excellent work. He thought he could say for the Police Commission that it was in favour of giving the 1,300*l.* grant to advance technical education. The Lord Provost then presented the prizes to the successful students during the year, the prizes consisting of volumes donated by the Worshipful Company of Plumbers. The prize-takers were (from Dundee) Messrs. Peter Edmonds (17 years of age), Thomas Kinnear (20), James Littlejohn (19), Alexdr. Young (19), and Alexander Ferguson (20). From Arbroath there were two prize-winners,—Mr. Thomas Grant (17) and Mr. James Carver (20).—Mr. Henderson submitted a letter to the meeting which the District Council had prepared to forward to the various Town and County Councils in the district. The letter set forth the claims of the plumbers, and asked that a portion of the residue grant in the hands of the Corporations approached should be devoted to the technical education of plumbers.—Dr. Lennox moved—"That this Council considers the technical education of plumbers a question of supreme importance, the provision of which is both difficult and costly, and approves of the proposed letter to the various health authorities in this district, recommending this question to their attention as one deserving substantial financial aid." He said it was perfectly obvious that the first requisite of technical education was to have efficient teaching, and good teaching, like good plumbing work, was a very costly matter. Plumbing was in reality a question for the community, and that trade, unlike others, specially affected the health and the well-being of the people in the town and district. Like the supply of water and other sanitary matters, it should be taken up by the sanitary authorities.—Mr. John Wood, Montrose, seconded the motion, which was carried.—Councillor Davidson, Perth, moved—"That this Council considers it

CONTRACTS AND PUBLIC APPOINTMENTS.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Stables and Sheds	Withington Loc. Bd...	A. H. Mountain	Jan. 5
*Station Improvements and Bridges over Railway and Stream, &c. Bridlington..	North Eastern Rly. ..	H. Copperthwaite	Jan. 6
Road Materials	West Sussex C. C.	C. Adcock	do.
*Slaters' and Plumbers' Works	Parish of St. Leonard, Shoreditch	*Official*	do.
*Alarm Posts and Calls to Firemen, &c. ..	Chiswick Loc. Bd.	A. Ramsden	do.
*Carting Away Sweepings, &c.	St. Marylebone Vestry	*Official*	Jan. 7
*Foundations of Retort House	Boro' of Stockport Gas Committee.....	S. Meunier	do.
Flagging and Paving	Blaydon Loc. Bd.	*Official*	do.
*New Police Station, Romford .	Essex C. C.	H. Stock.....	Jan. 8
*Sewerage Works	Lichfield U.S.A..... ..	C. J. Corrie	do.
Piling and Concrete Foundation Work, Electric Lighting Station	Bristol U.S.A.....	H. Williams.....	do.
Engineer's Workshop, &c. near Kingston, Halifax	.....	Jas. Farrar	Jan. 9
Additions to Bridge, Linwood, Renfrewshire.....	Committee	Caldwell, Muir, & Caldwell	Jan. 11
Villa, Rose-street, Elgin, N.B.....	.....	G. Sutherland	do.
12 Cottages, Ryton, Bar Moor, Newcastle-on-Tyne	Co-operative Society..	.....	do.
*Stoneware Pipe Sewer.....	Islington Vestry.....	J. P. Barber.....	do.
*Repair of Private Roads.....	Croydon Council.....	*Official*	Jan. 12
*Works and Materials	Wandsworth B. of W.	do.	do.
Subway (Contracts 2, 3, 12, and 13)	Glasgow Dist. Subway Co.	Simpson & Wilson....	do.
Water Supply Works, Neilston	Renfrewshire C. C. ..	Niven & Haddin	do.
Waterworks	Ashton-under-Lyne, Stalybridge, & Dukinfield Waterworks Committee.....	G. H. Hill.....	Jan. 13
Waterworks, Innellan	Argyll County Council	Jas. Wilson	do.
*Erection of Pavilion on Pier Head	Brighton West Pier Co.....	R. W. P. Birch	Jan. 14

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor or Engineer.	Tenders to be delivered.
Congregational Church and Schools, Chichester	.....	E. J. Hamilton	Jan. 15
*Enlargement of Head Post Office, Brighton	H. M. Works	*Official*	do.
Private Railway Line, Hopetoun, near Winchburgh, N.B.....	Young's Paraffin Light, &c. Co.	.....	Jan. 16
Street Paving Works	Glasgow Police Com.	*Official*	Jan. 21
Lodge, Lilford, Northampton.....	.....	R. W. Collin	Feb. 1
*New Engine and Well House	Widnes Local Board..	C. O. Ellison & Son ..	do.
*Erection of School Buildings	Hornsey School Board	Chas. Bell	Feb. 2
*Iron Bridge over Railway, Hull	North Eastern Rly. ...	H. Copperthwaite	Feb. 8
*Alteration to Farmhouse, Carnford	.....	.....	No date.
Restoration of Church, Carlton, near Worksop.....	Committee	.....	do.
Alterations, &c. St. Matthew's Parsonage, Crumlin-road, Belfast	.....	J. Fraser & Son	do.
Residence, Longwall, Kirkandrews, Cumberland	J. N. Robinson	J. Graham.....	do.
Additions to "Whinfield," Headingley, Leeds	A. F. L. Hepton.....	T. Butler Wilson	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Architect and Surveyor	Worshipful Company of Cutlers	Not stated	Jan. 12
*Dublin District Surveyorships	Civil Service Commrs.	do.	Feb. 10
*Assistant Instructor in Geometrical Drawing.....	Royal Indian Engineering College.....	250*l.*	No date

Those marked with an Asterisk (*) are advertised in this Number. *Contracts, pp.* iv., vi., viii., & x. *Public Appointments, p.* xxxi.

desirable at the present opportune time to call the attention of every registered master in the district to the valuable assistance he may give to the registration movement by employing only such journeymen as are registered, and such apprentices as will attend classes in theoretical plumbing work if such be within their reach." Councillor Smart, Perth, seconded, Mr. Lorimer, Broughty Ferry, supported, and the motion was adopted.

TELEPHONES.—Messrs. Nussbaum have recently made a complete installation at the "Adelphi" Hotel, Liverpool. The installation comprises three floors, and on each floor a switch board for seventy directions is fitted. The total number of stations being 210. Each room is fitted with a call-box and double "Ader" instrument (magnetic transmitter), a separate call-bell and a three-contact pear push, which is suspended near the bed, so that the visitors can ring in the usual way or communicate through the telephone. The visitors are able to communicate through the telephone. The visitors can communicate with one another and with the staff of the hotel. This effects great saving of time both for visitors and staff.

THE PHOTOGRAPHIC LENS.—Messrs. R. & J. Beck, of Cornhill, send us a useful pamphlet they have issued, giving a simple description of the principles and method of application of the photographic lens, mainly with a view to assisting amateur photographers.

ENGINEERING EDUCATION IN THE BRITISH DOMINIONS.—Under this heading, a pamphlet of about seventy pages is issued by the Institution of Civil Engineers, giving a statistical statement as to the various educational institutions in the British Dominions where instruction is given bearing on the profession of civil engineering. The book also contains the regulations of the Council as to the admission of students, and a list of public examining bodies and examinations recognised by the Council.

PROPOSED RAILWAY THROUGH SIBERIA.—The Institution of Civil Engineers publishes in a pamphlet form the paper on this subject read before the Institution by Mr. W. M. Cuningham. The paper contains a consideration of the proposed routes, and a map containing special information from materials furnished by the author.

THE PUBLIC HEALTH (LONDON) ACT. — An abstract of clauses of this Act, reprinted from the "Metropolitan Local Government Journal," is issued by Messrs. S. Edgecumbe-Rogers. It is a useful guide to the Act in the shape of a small pamphlet summarising and classifying its provisions.

VENTILATION, MUNICIPAL BUILDINGS, ALLOA.—The Town Council of Alloa have entrusted the ventilating and heating of the municipal buildings of that town to Messrs. Baird, Thompson, & Co., of Glasgow. The County Council have also instructed this firm to examine and report upon the heating of the County Buildings, and to prepare plans.

CHRISTMAS FESTIVITY AT EXETER.—Mr. Harry Hems gave his twenty-third annual Christmas dinner to poor old people on Christmas day, when sixty *invités* sat down to table. On Monday last Mr. and Mrs. Hems entertained at tea seventy children from St. Martha's Orphanage and other places.

FAILURES IN THE BUILDING TRADE IN 1891.—The supplement to *Kemp's Mercantile Gazette* for December 30, in its statistical abstract of failures, &c., during the year 1891, states that the number of failures in the building and timber trades was 525, as compared with 564 in 1890, showing a decrease of thirty-nine.

THE "BRITISH ALMANACK."—In reference to our notice of this, we have received the following:—"Pardon my pointing out that the article on 'Engineering,' in the 'British Almanack' for 1892, was not written by Mr. J. S. Shedlock (who writes on 'Music'), but by your obedient servant, R. L. C. (the writer of the 'Architecture' article)."

VENICE AT "OLYMPIA."—We are informed that most of the houses forming modern Venice at Olympia were executed in fibrous plaster by the Plastic Decoration Company, Limited, Wellington-street, Strand, from photographs of buildings taken on the spot. The architectural features have, it is stated, been closely followed. The company have also carried out about 10,000 square yards of slab-plastering throughout the buildings to meet the requirements of the London County Council.

THE SANITARY INSTITUTE'S EXAMINATIONS FOR INSPECTORS OF NUISANCES.—At an examination for Inspectors of Nuisances, held at Manchester on December 18 and 19, fifty-three candidates presented themselves. Questions were set to be answered in writing on the 18th, and the candidates were examined *viva voce* on the 19th. Thirty-seven candidates were certified to be competent, as regards their sanitary knowledge, to discharge the duties of Inspector of Nuisances.

TERRA-COTTA AS A FIREPROOF MATERIAL.—The *Southampton Observer* of the 19th ult. contained an account of an experiment made two days before with the view of showing the value of terra-cotta as a fireproof material for the erection of houses and other buildings. The experiment took place at the works of Messrs. M. H. Blanchard & Co., successors to Coade's original Terra-Cotta Works, Lambeth (established 1769), and the scene for the experiment was at their works at Bishop's Waltham, Hants. The object of the experiment was to show that there need be no more burning floors, walls, staircases, or roofs if constructed of terra-cotta, even were ever so intense a fire to break out, that if the conflagration broke out in one room it could not possibly extend to the next apartment, nor could the means of escape from the upper to the lower part of the house be cut off through the burning of the staircase, which has been the occasion of many fatal disasters. This result is, it is claimed, ensured by using Mr. M. H. Blanchard's patent fireproof terra-cotta chambered blocks, slabs, and tiles, which are described as suitable for all building purposes, and artisans' dwellings, warehouses, residential flats, from the humblest dwelling to the palatial mansion. The experiment was made in a little building of the dimensions of one room of an ordinary house, with brick sides, and a terra-cotta floor above, the pieces being so dove-tailed as to render it almost hermetically sealed. This floor was reached by means of a wide staircase, with an ornamental balustrade resembling that of carved oak. In the room below faggots of wood were piled up to the ceiling. Round these at the bottom were placed tar barrels, with a layer of straw. The mass was set on fire, and the fire burnt with great intensity. While this was going on most of the visitors ascended the staircase, and stood on the floor, feeling the slabs from time to time to see if the heat was making any impression on them, but throughout the whole trial they maintained almost the same temperature, being quite cold. By-and-by the fierce flames lapped themselves round the staircase, cutting off retreat by that way, and had it been composed of wood short work would have been made of it. However, beyond being slightly blackened by smoke, it remained as impassive as the floor above. The room was one mass of white heat, resembling in colour molten lead. Had the floor fallen in at that time cremation would have been the fate of those on it. The party remained on the roof from half to three-quarters of an hour,—a sufficient period to put the experiment to the severest test,—and so little had they felt the heat below that many shivered with cold. Immediately the visitors descended, a large number of the workmen and boys ran up the stairs and jumped about on the floor, which apparently had not in any way been affected by the great heat, though the fire continued to burn for a considerable time afterwards.

SOCIETY OF ANTIQUARIES OF SCOTLAND.—The first monthly meeting of this Society for the present session was held in the Society's Library, Queen-street, Edinburgh, on the 14th ult., Sir Arthur Mitchell, K.C.B., in the chair. The first paper read was on trepanning the human skull in pre-historic times, by Dr. Munro, secretary.—The second paper was entitled "Notes on examples of old heraldic and other glass existing in or having connexion with Scotland, with special reference to the heraldic rondel preserved at Woodhouselee," by Mr. J. M. Gray, Curator of the National Portrait Gallery, F.S.A., Scot. The author showed the progress which had been made in our knowledge of the existence of examples of stained glass in Scotland since Mr. George Seton submitted a paper on the subject to the society in 1878, and he pointed out how the result of the recent Heraldic Exhibition had been to add considerably to the list then made up by Mr. Seton. Having referred to some fragments of stained glass from Dunfermline exhibited by Sir J. Noel Paton, and to the heraldic shields and other fragments in the windows of Stobhall, the fine rondel at Fyvie Castle, and the missing St. Bartholomew of the Magdalen Chapel, Mr. Gray exhibited a full-sized outline lithograph of a glass panel and border in the possession of Mr. Albert Hartshorne, F.S.A., the panel representing a traditionary event in the life of Sir Alexander Stewart, great grandson of Walter Stewart, Seneschal of Scotland, and the border including a Stewart family tree, the panel, however, being manifestly modern work, probably of the present century, although the border is, doubtless, of the date with which it was inscribed, viz., 1574. The rondel from Woodhouselee, it was explained, shows the Royal Arms of Scotland impaled with those of Anne of Denmark, Queen of James VI., with a decorative border of a conventional Renaissance arrangement of fruit and leafage.—The third paper was a notice of a submarine deposit of Sarnian ware from the Pan Rock, off the coast of Kent, by Mr. John T. Beer, F.S.A., Scot.

CHOIR STALLS, CHRIST CHURCH, CLIFTON.—The new choir stalls in Christ Church, Clifton, which have been placed there in memory of the late Rev. Edward Young, were used for the first time on the 20th ult. The stalls are of oak, in the Early English style of carving. The work has been carried out by Messrs. Cornish & Gaymer, of North Walsham, from the designs of Mr. Bassett Smith.

THE NEW GOTHENBURG WATERWORKS. — The water supply of Gothenburg having for some time proved insufficient, it has been decided to obtain an additional one from the Göta river. The works which are now being carried out will cost about 70,000*l.*

TELEPHONE BETWEEN STOCKHOLM AND CHRISTIANIA.—The Parliaments of Sweden and Norway have voted 3,600*l.* each towards establishing telephonic communication between the capitals of the two countries.

LIVERPOOL ENGINEERING SOCIETY.—The fifth ordinary meeting of the present session was held at the Royal Institution on the 23rd ult., Mr. George Farren, Assoc.M.Inst.C.E., in the chair. Mr. A. W. Brightmore, M.Sc., Assoc.M.Inst.C.E., read a paper entitled, "Methods of Collecting Water for Supply." The author divided his subject into three parts. 1. Interception of rain-water before reaching the earth, by collecting it directly in tanks or from the roofs of buildings. 2. Taking the water from streams or rivers directly, if the flow is sufficiently constant, or by equalising the supply by constructing a reservoir if the flow varies below the supply required. 3. Obtaining the water from the earth's crust by means of springs, shallow wells, intercepting tunnels or drains, or deep-seated wells. He then proceeded to discuss the probable state of purity of the water derived from each of these sources, and gave examples of towns and cities, either in Europe or America, supplied on each system. It was pointed out that the supply obtained by direct interception could only be very limited. With respect to the supply procured from streams or rivers, it was shown to be free from contaminating influences, if obtained near to the source of the streams, hence the advantage of a water-supply from an equalising reservoir. Referring to the third method, water collected from shallow depths by means of wells or intercepting drains was shown to be useful for supply when derived from sparsely populated districts. Water from deep-seated springs or wells, owing to its infiltration through the overlying strata, is often of great purity and valuable for supply. An interesting discussion followed.

"BLESSED COMPULSION" IN SANITARY MATTERS.—We are very glad to see that at some of the recent conferences of political parties sanitary questions have come very much to the fore. Sanitation of the village is to be already part of the work of the proposed parish councils, and the sanitation of London is likely to be prominent in the programme of parties in the County Council. We note with satisfaction a leading public journal speaking of that "blessed word compulsion" in this respect. It is all the more satisfactory because the blessings of such compulsion are lauded by an organ of the Liberal party. Hitherto it has been chiefly from Conservative statesmen that necessary compulsion in sanitary matters has been obtainable; and a good deal of the failure of the action of the Public Health Law and of Acts such as the Infant Life Protection Act has been due to the unwillingness of statesmen of the *doctrinaire* school of politics to accept the principle of compulsion, and their preference for the doctrine of education by painful local failure and voluntary repentance and enlightenment. Experience has, we hope, taught that a little "blessed compulsion,"—the word "must" instead of "may" in many Acts of Parliament,—would tend greatly to the public welfare.—*British Medical Journal.*

WELL-SINKING.—Mr. Richard D. Batchelor, artesian well engineer, of Chatham, has opened a London office and show-rooms at 73, Queen-Victoria-street.

ERRATUM.—In the article on "Architecture at the Scottish Academy" last week a printer's error, which escaped notice, transformed the "great fireplace" in the old Parliament Hall of Edinburgh Castle into the "Greek fireplace." Edinburgh has been called the "modern Athens," but had not quite come into the title at that date.

MEETINGS.

SATURDAY, JANUARY 2.

Sanitary Inspectors' Association.—The President, Dr. B. W. Richardson, will deliver a New-Year's Address. 6 p.m.

MONDAY, JANUARY 4.

Surveyors' Institution.—Adjourned Discussion on Mr. C. H. Bedells's paper on "Party and Party-Fence Walls." 8 p.m.

TUESDAY, JANUARY 5.

Glasgow Architectural Association.—Mr. C. R. M'Intosh on "An Italian Tour." 8 p.m.

WEDNESDAY, JANUARY 6.

British Archæological Association.—(1) Mr. Andreas E. Cockayne on "Archæology in Derbyshire." (2) Dr. Fryer on a "Find of Roman Remains at Caerleon." 8 p.m.

Civil and Mechanical Engineers' Society.—Mr. Reginald Bolton on "The Square Drilling Machine and its Uses." 7 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

16,497.—FIRE-PLACES AND RANGES: *S. Smith.*—The fret of the front bar in the fire-places and ranges described in this specification is cast with two pins or lugs, one at each end, and secured to the front and allowed to turn down. Two levers with toothed racks work on the frame and lift the bottom bar to the height required. Simplicity, and dispensing with false or loose bottoms, are the main points in the invention.

19,763.—CLOSET AND PIPE-FITTINGS: *Daniel Baker.*—The trap, arm, and junction are, according to this patent, cast in one piece, and will take any kind of pan or closet. A special joint is used, and lugs or ears are cast on the junction so as to form a drip, conducting the leakage or rain down the pipe and preventing its soiling the wall.

20,813.—BRICKMAKING MACHINERY: *A. Gibbs.*—According to this invention, rolls having rings provided with teeth or projections are so fixed and fitted that one revolves quicker than the other, the effect being that the grinding is facilitated, and the rolls are prevented wearing unevenly.

747.—FIRE-GRATES: *W. P. Redish.*—In the form of fire-grate, which is the subject of this patent, a stepped back advances from the bottom to the top. A pivotted ash carrier is fixed beneath, and grate bars are fixed at an angle to improve the combustion and facilitate the removal of the burnt fuel.

789.—WINDOW-SASHES AND FRAMES: *J. Gibson.*—To prevent draughts or the sashes becoming loose and shaking. The frames, which are the subject of this patent, have metal flanges or feathers, and grooves or guides of angle metal pieces which form the sliding arrangement.

917.—DECORATIVE MATERIAL: *E. S. Sears.*—This specification relates principally to embossed and decorative paper, wood pulp, cloth, leather, or similar materials which are simultaneously embossed, coloured, and tinted by improved machinery described in the specification.

5,988.—FLOOR AND STAIR-TREADS: *J. & J. Mason and Others.*—By this invention a hard metal plate is combined with a softer anti-slipping material. The main plate is prepared so as to give a back plate with raised ribs and openings. The ribs are made with a longitudinal V depression.

NEW APPLICATIONS FOR LETTERS PATENT.

December 14.—21,837, G. Toos, Fastening Device for Sky or Fanlight Windows, &c.—21,866, A. Taylor, Dressing and Levelling Flagstones, &c.

December 15.—F. Lynde, Joints of Drain and other Pipes.—21,909, W. Thornburn, Raising, Lowering, and Securing Sliding Sashes.—21,965, J. Bardsley, Door Springs and Checks.—21,967, G. Briggs, Bricks or Building Blocks.

December 16.—F. Hart, Measuring and Proportionally Describing Graphically Sections of Tunnels, &c., also Openings generally of Limited Height and width.—21,994, W. Hooks, Waste-water Preventing Flushing Cistern.—21,997, J. Thompson, Fire-resisting Brick and Material for Lining, Facing or Coating Fireplaces, &c.—22,031.—A. McKay, Extricating Damp from Walls, &c.—22,036, W. Tucker, Antidrip Sash Bar.

December 17.—22,048, R. Johns, Roofing, &c.—22,080, J. Grubb and W. Sturge, Roses for Ceilings and Wall-connectors for Electrical Purposes.—22,087, A. Mould, Fire-places and Mantel-pieces.—22,111, E. Nelson, Damp Course in Building Foundations.—22,121, L. Olmsted, Metal Handle for Saws.

December 18.—22,141, E. & O. Howl, Extracting Steam by Mechanical Arrangement from Hoffman and other Brick-kilns (other than by means of a Chimney or Stack).—22,171, T. Smith, Compounds or Cements.—22,172, J. Bordnave, Pipes, Tanks, and other Structures Composed of a Metal Framework Combined with Cement, &c.

December 19.—22,198, F. Willis and R. Astley, Fireproof Floor.—22,202, C. Henshaw, Shop-door and Casement-fasteners.—22,209, J. & A. Duckett, Water-closets.—22,212, E. Wilson, Machines for Carving or Shaping Wood.—22,215, E. Morrison & M. Ingram, Water-closets.—22,241, C. Lund, Window-sash Fasteners.—22,243, T. Bretherton, Ironcrete Pavement.—22,254, J. Lilly, Door-latches.—22,256, G. Couzens, Gully-traps.

PROVISIONAL SPECIFICATIONS ACCEPTED.

20,019, C. Watts, Pipes for Circulation of Hot Water in Heating Greenhouses, &c.—20,096, J. Wilson, Kilns for Drying and Burning Bricks, &c.—20,218, A. Boult, Devices for Protecting Window-curtains from Casement-windows.—20,230, Craven Dunnill & Co., Ltd., and F. Smith, Tiles, &c.—20,467, J. Kirkman, Waste Water-closets.—20,646, H. Parry, Kilns for Burning Lime.—20,725, W. Bloor, Door-latches.—20,772, H. Smart, Planes.—20,806, A. Illidge, Sash-fasteners.—20,998, A. Vincke, Window-frames and Fittings.—21,004, H. Cribb, Preparing, Fitting, and Laying Blocks for Floors, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

1,885, H. Symons, Slate Slip, principally for Repairing Slated Roofs.—2,278, F. Smith, Bakers' Ovens.—2,536, J. Rae and J. Murdock, Chimney Tops, &c.—2,554, W. Ingram, Spirit Levels.—2,787, T. Hendry and J. Wilkinson, Ventilators or Ventilating Cowls.—3,161, C. Abel, Metal Framework for Portable Structures.—4,161, T. Kemp, Testing Drains.—14,776, L. Camus, Heating Apparatus.—14,820, C. Henderson, Warming, Ventilating, and Lighting Apartments.—19,664, J. Stevens and C. Major, Door Springs and Checks.—19,776, J. Fairfax, Doors and Windows.—19,962, A. Clark, Sash-fasteners.—19,966, H. Lake, Feeding Mechanism for Woodworking Machinery.—20,100, C. Harwood, Water-waste Preventing Cistern for Water-closets.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

DECEMBER 17.—By *Wilkinson, Son, & Welch* (at Hastings): "Brunswick House," Marine-parade, Hastings, f., r. 150*l.*, 2,400*l.*

DECEMBER 18.—By *Wilkinson, Son, & Welch* (at Brighton): 25, 23, and 27, Lower-rock-gardens, Brighton, f., r. 230*l.*, 3,020*l.*; 1, Wyndham-st., f., r. 45*l.*, 620*l.*; 38, Clarendon-villas, Hove, f., 700*l.*

DECEMBER 21.—By *Maddox & Son*: A moiety of the "Hope Tavern," in Tottenham-st.; and 41, Whitfield-st., Tottenham-court-rd., f., r. 212*l.* 10s., 2,250*l.*—By *J. E. Pinder*: 29, Albion-sq., Dalston, u.t. 48 yrs., no g.r., r. 40*l.*, 455*l.*—By *B. Brown*: 155, Grundy-st., Poplar, f., 305*l.*; f g.r. 10*l.*, Canon-rd., Hornsey, with reversion in 84 yrs., 240*l.*; 22, Digby-rd., Homerton, f., r. 22*l.* 2s., 165*l.*—By *Jenkins & Sons* (at Deptford): 13 and 15, Walpole-st., New-cross, u.t. 61 yrs., g.r. 9*l.*, r. 57*l.* 4s., 325*l.*; 193 and 195, Lewisham High-rd., u.t. 14 yrs., g.r. 70*l.*, r. 195*l.*, 1,000*l.*; 174, Lewisham High-rd., u.t. 59 yrs., g.r. 9*l.* 6s., r. 60*l.*, 560*l.*; 55, Breakspeare-rd., u.t. 83 yrs., g.r. 11*l.* 15s., r. 68*l.*, 600*l.*; 10, Bramblebury-rd., Plumstead, u.t. 53 yrs., g.r. 2*l.* 11s., r. 22*l.* 2s., 185*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	9/0/0	0/0/0
Teak, E.I... load	9/10/0	15/0/0
Sequoia, U.S. ft. cu.	2/3	3/0
Ash, Canada load	2/10/0	4/0/0
Birch, do.	3/0/0	4/5/0
Elm, do.	3/10/0	4/15/0
Fir, Dantsic, &c.	2/0/0	3/10/0
Oak, do.	2/10/0	4/10/0
Canada.....	5/0/0	7/0/0
Pine, Canada red	2/10/0	3/10/0
Do, yellow	2/10/0	5/0/0
Lath, D'ntsic, fath	5/5/0	6/10/0
St. Petersburg	5/10/0	7/10/0
Deals, Finland, 2nd & 1st std 100	8/10/0	10/10/0
Do, 4th & 3rd..	7/10/0	8/10/0
Do. Riga	6/10/0	8/0/0
St. Petersburg, 1st yellow ..	10/10/0	15/0/0
Do. 2nd yellow	8/10/0	10/0/0
Do. white	7/0/0	10/10/0
Swedish	7/15/0	16/0/0
White Sea	8/10/0	17/10/0
Canada, Pine 1st	19/10/0	25/10/0
Do. do. 2nd....	14/10/0	16/10/0
Do. do. 3rd, &c.	6/10/0	10/10/0
Do. Spruce. 1st	8/10/0	11/0/0
Do. do. 3rd & 2nd.....	6/10/0	8/0/0
New Brunswick	7/0/0	7/10/0
Battens, all kinds	8/10/0	15/10/0
Flooring Boards, sq., 1 in. prep. 1st	0/8/6	0/14/6
Do. 2nd.....	0/7/6	0/11/6
Other qualities	0/5/3	0/8/0
Cedar, Cuba ..ft.	/3½	/4½
Honduras, &c.	/3½	/4½
Mahogany, Cuba.	/4½	/6½
St. Domingo, cargo av	/4½	/6½
Mexican do. do	/4	/5
Tobasco do. do	/5½	/7
Honduras do..	/5½	/6½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio.....	10/0/0	20/0/0
Bahia	9/0/0	18/0/0
Satin, St. Domingo ....ft.	0/0/3	0/1/3

TIMBER (*continued*).		
Satin, Porto Rico	0/0/10	0/1/0
Walnut, Italian..	0/0/3½	0/0/7

METALS.		
IRON—Pig, in Scotland .....ton	2/7/3	2/7/6
Bar, Welsh, in London.....	6/0/0	6/2/0
Do. do. at works in Wales	5/10/0	5/12/6
Do. Staffordshire, in London	6/10/0	6/15/0
COPPER—British, cake and ingot	48/0/0	49/10/0
Best selected ..	49/0/0	50/0/0
Sheets, strong..	58/0/0	59/0/0
Chili, bars	45/0/0	45/7/6
YELLOW METAL lb.	0/0/5½	0/0/5¾
LEAD—Pig, Spanish....ton	11/5/0	11/6/3
English, com. brands	11/7/6	11/10/0
Sheet, English, 3 lbs. per sq. ft. and upwards ..	13/0/0	0/0/0
Pipe	13/10/0	0/0/0
ZINC—English sheet .....ton	26/0/0	0/0/0
Vieille Montagne.....	26/10/0	0/0/0
TIN—Straits	90/5/0	90/15/0
Australian	90/5/0	90/15/0
English Ingots	94/0/0	95/0/0

OILS.		
Linseed .....ton	19/0/0	19/5/0
Cocoanut, Cochin	26/10/0	0/0/0
Do. Ceylon	23/10/0	0/0/0
Palm, Lagos	23/0/0	24/0/0
Rapeseed, English pale	29/10/0	0/0/0
Do. brown	27/15/0	0/0/0
Cottonseed ref...	18/10/0	0/0/0
Oleine	0/0/0	0/0/0
Lubricating, U.S.	4/10/0	5/10/0
Do. refined	6/0/0	11/0/0
TAR—Stockholm barrel	0/19/0	0/0/0
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

CARDIFF.—For the erection of additional buildings, for the Cardiff Tin Stamping and Enamel Company, Limited, East Moors. Mr. W. I. Grylls, architect, 37, St. Mary-street, Cardiff. Quantities by the architect:—

Jno. Strachan	£2,784 0	Thos. Gough	£2,369 10
Jas. Allan	2,572 3	John Hopkins	2,365 0
Edward T. Hatherly ..	2,557 0	John W. Roger	2,350 0
Johnson Bros.	2,507 0	Exors. of W. Gradwell .	2,265 0
Powell & Mansfield	2,497 0	Thos. D. Ridley, Middlesbrough & Cardiff* ..	2,193 0
Williams & Thomas....	2,490 0	E. Harvey	2,151 13
Thomas & James	2,477 0		

* Accepted.

CHISWICK.—For certain reparations to the fronts and basements of three houses, at Strand-on-the-Green. Mr. H. Hardwicke Langston, architect, 9, Great James-street, Bedford-row, London. Quantities not supplied:—

Vare Bros.....	£278	Fagg*	£179
Patten	183		

* Accepted.

CLACTON-ON-SEA.—Accepted for building five pairs of villa residences, for Mr. A. R. Chamberlain, in Station-road. Messrs. Homer & Ridler, architects, 35, Bucklersbury, E.C.:—

Ellis & Turner	£6,218 0 0

DEVONPORT.—For the erection of farm buildings, at Inswork, Barton Millbrook, Cornwall, for the Right Hon. Baron Clinton. Mr. W. N. Richards, architect, 29, St. Aubyn-street, Devonport:—

Jenkin & Son.....	£3,561 10	W. Trevena.....	£2,593 5
A. Andrews	3,200 0	G. Smith & Son, Devonport*.....	2,479 15
G. Shellabear.....	2,940 0		
G. Glanville	2,900 0		

* Accepted.

ECCLESHILL (Yorks.)—Accepted for the erection of a cloth warehouse at The Old Mill, Eccleshill, for Messrs. Smith & Hutton. Messrs. Jowett Kendall & J. Harper Bakes, architects, Calverley-chambers, Victoria-square, Leeds. Quantities by the architects:—

Mason.—J. Thornton & Son, Idle	£289 0 0
Joiner.—Bakes & Overend, Eccleshill	146 0 0
Plumber and Painter.—Thos. Norton, Eccleshill	35 0 0
Plasterer.—Andrew Taylor, Eccleshill.....	15 0 0
Slater.—T. & A. Thornton, Eccleshill	23 18 6
Total amount.....	£508 18 6

GREAT YARMOUTH.—For the erection of a pair of semi-detached houses, Wellesley-road. Messrs. Bottle & Olley, architects, Great Yarmouth. Quantities by architects:—

J. F. W. Bray.....	£1,888 0	J. S. Cooper.....	£1,784 0
R. Darby	1,869 13	G. W. Beech	1,749 10
N. Cork	1,848 0	J. Batchelor	1,667 0
James Leggett	1,795 0	G. Beckett (accepted) ..	1,648 10

[All of Great Yarmouth.]

GREAT YARMOUTH.—For additions to Messrs. Arnold's premises, King-street. Messrs. Bottle & Olley, architects, Great Yarmouth. Quantities by architects:—

Rand & Cooper	£1,297 15	James Leggett	£1,250 0
C. Wiseman	1,294 10	G. T. Flaxman	1,242 10
G. W. Beech	1,282 0	J. S. Cooper	1,231 0
R. Eastoe.....	1,276 0	C. C. J. Catley	1,220 0
R. Davy	1,259 17	Wm. Cork*	1,216 0
Grumble & Watts	1,258 0		

* Accepted.

[All of Great Yarmouth.]

LONDON.—For the erection of three factories in Kentish Town-road, N.W., for Mr. Thos. J. Brinsmead, and Mr. Chas. Goddard. Mr. Leonard V. Hunt, architect, 35, Queen Victoria-street, E.C. Quantities by Mr. Geo. Fleetwood:—

Holloway Bros.....	£10,870	Pink, Fryer, & Co.	£10,143
W. Goodman.....	10,478	Macfarlane Bros.	9 770
J. Brown & Son	10,436	E. Toms.....	9,729
W. Scrivener & Co.	10,357	Mattock Bros.	9,660
Whitehead & Co.	10,250	Gould & Brand*.....	9,291
Harris & Wardrop	10,168		

* Accepted.

LONDON.—For alterations to "The Weavers' Arms" public-house, 1, Warley-street, Bethnal-green, E., for Mr. J. Hassell. Mr. W. Seckham Witherington, architect, 79, Mark-lane, E.C.:—

Larke & Son.....	£1,384	Lascelles & Co.....	£1,280
Kearley	1,366	Hood (accepted)	1,005

LONDON.—Accepted for sanitary works, additions, and decorations at 20, Albion-street, Hyde Park, W.:—

Benjamin & Robinson, 35, Cambridge-street, Hyde Park....	£288

LONDON.—Accepted for painting and repairs at the "Queen's Head" public-house, Wharf-road, City-road, for the Cannon Brewery Company. Messrs. F. Chambers & Son, architects:—

Snewin Bros. & Co., Clapton	£105 0 0

LONDON.—For pulling down and rebuilding the "Langton Arms" public-house, Norman-street, St. Luke's. Mr. R. Roberts, architect:—

C. Cox	£2,464	W. Gladding	£2,377
Outhwaite & Son	2,447	Snewin Bros. & Co., Clapton (accepted)	2,295
Ashby & Horner	2,447		
F. & F. J. Wood	2,418		

LONDON.—Accepted for the erection of stables and other works in connexion therewith at Highgate Lodge, for Mr. H. Regnart. Mr. R. J. Beale, architect:—
Percival Hart, Station Works, West Green, N. .. £496 0 0

LONDON.—For alterations, new shop, and showroom, 164, Tottenham Court-road, for Messrs. T. W. Thompson & Co. Mr. Ernest H. Abbott, architect, 6, Warwick-court, W.C. Quantities by Mr. A. Johnson, 50, Imperial-buildings, Ludgate-circus:—

T. W. Smith & Son	£1,046 0	Hall, Beddall, & Co.	£802 0
A. J. & C. Hocking	845 5	Scrivener & Co.	759 0
F. & H. F. Higgs	837 0	Scharien & Co.	730 0

LONDON.—For building new riding-school at Gloucester-gate, Regent's Park, for Mr. Parry. Mr. Horace Dove, architect, 4, Tokenhouse-buildings:—

Lown	£2,663	Gould & Brand	£2,489
Scrivener & Co.	2611	Martin, Wells, & Co.	2,360
Williams	2,589		

RUGELEY.—For the erection of a new infants' school, Talbot-street, Rugeley. Mr. John Greensill, architect:—

J. T. Clark	£1,294	Bradney & Co.	£1,176
G. J. Muirhead	1,200	S. Wootton	1,113
G. Linford	1,192	Thomas Mason, Hednesford (accepted).	1,062
A. F. Whittome	1,179		

SOUTHAMPTON.—For alterations, additions, and improvements at the Eastern District Board School, for the Southampton School Board. Mr. J. H. Blizard, architect:—

Jackson	£2,850	Bolton	£2,296
J. Dyer	2,379	Rowland	2,199
Stevens & Co.	2,374	J. Crook & Son*	2,190
Roe & Co.	2,365		

*Accepted.

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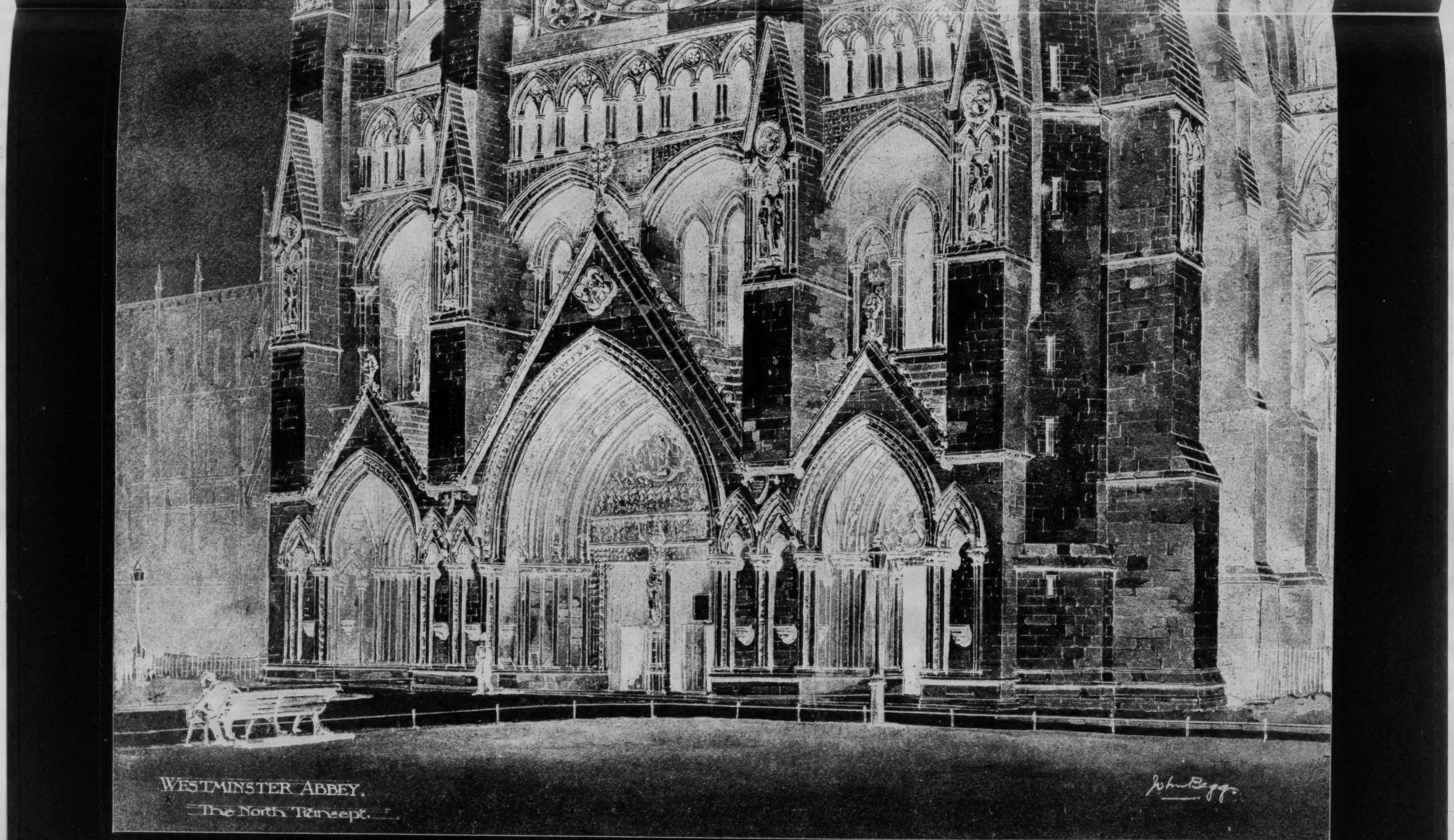

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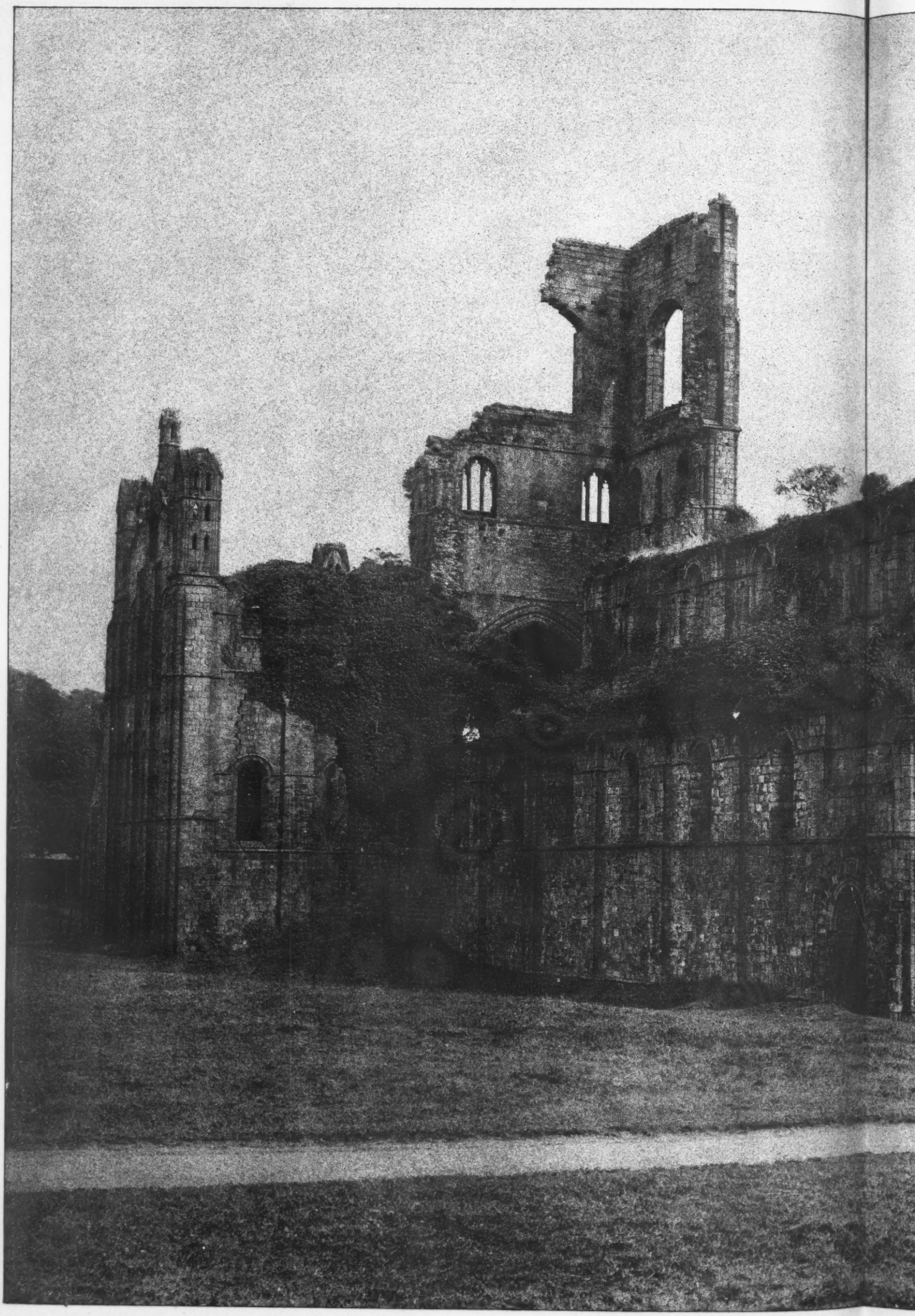

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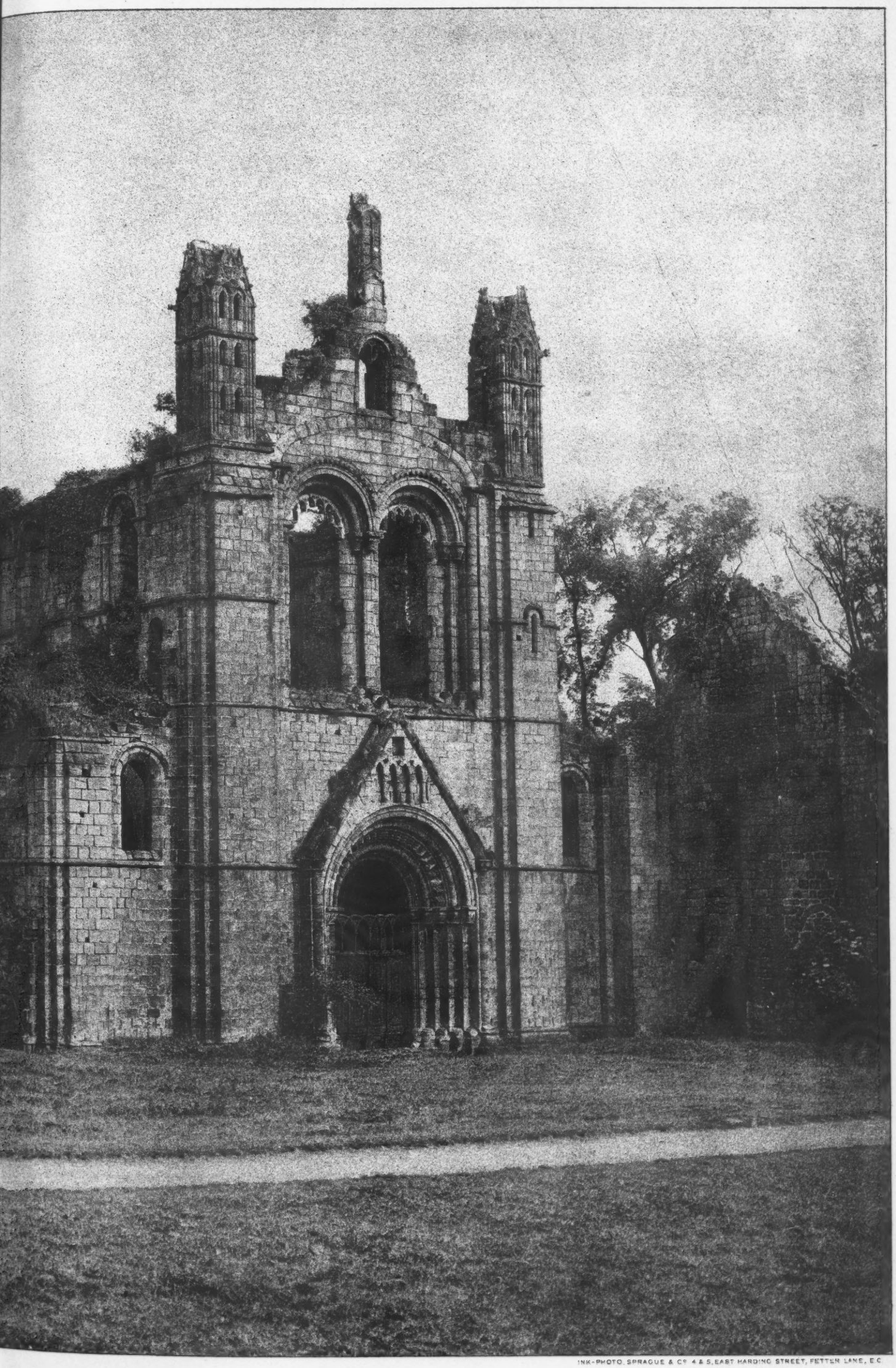

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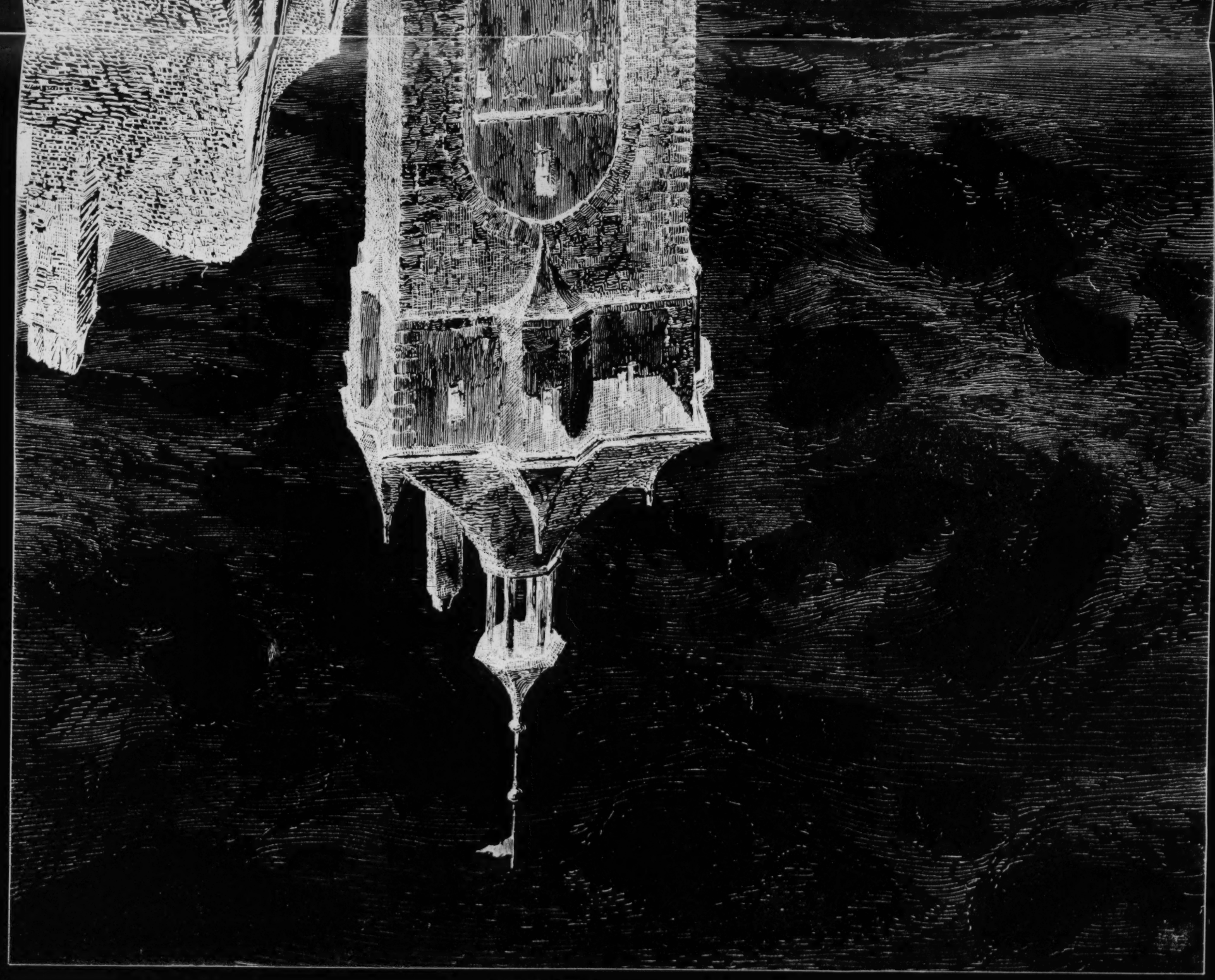
1798-1863
SES
ADMIRATEURS.

"LE TEMPS PORTANT LA RENOMMÉE."

MONUMENT TO DELACROIX IN THE GARDENS OF THE LUXEMBOURG, PARIS. M. DALOU, SCULPTOR.



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ST. PETER'S DOME, FROM THE PIAZZA DELLA SAGRESTIA

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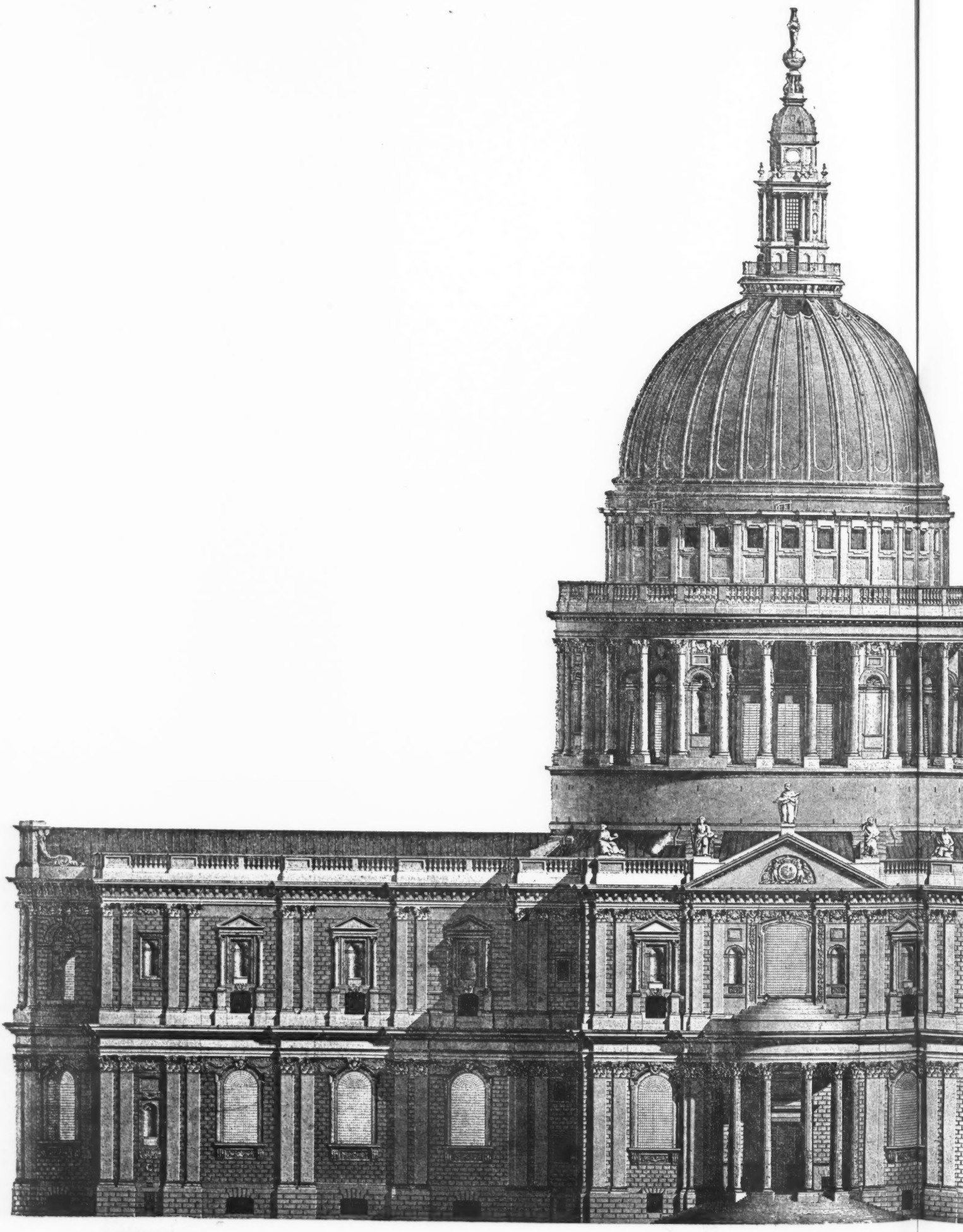
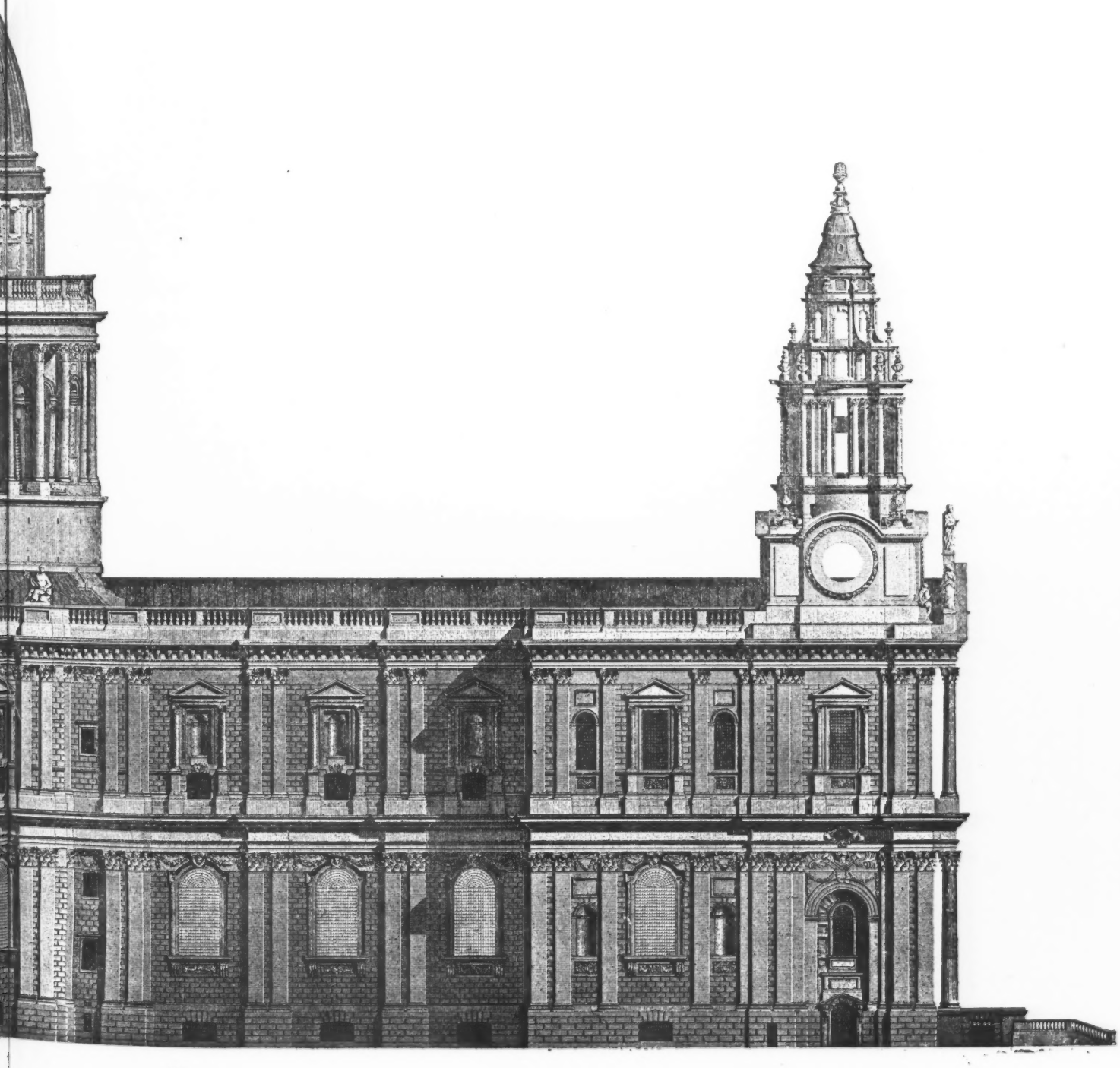


0 10 20 30 40 50

Scale of Feet.

North Elevation of St. Paul's Cathedral: from an engravi



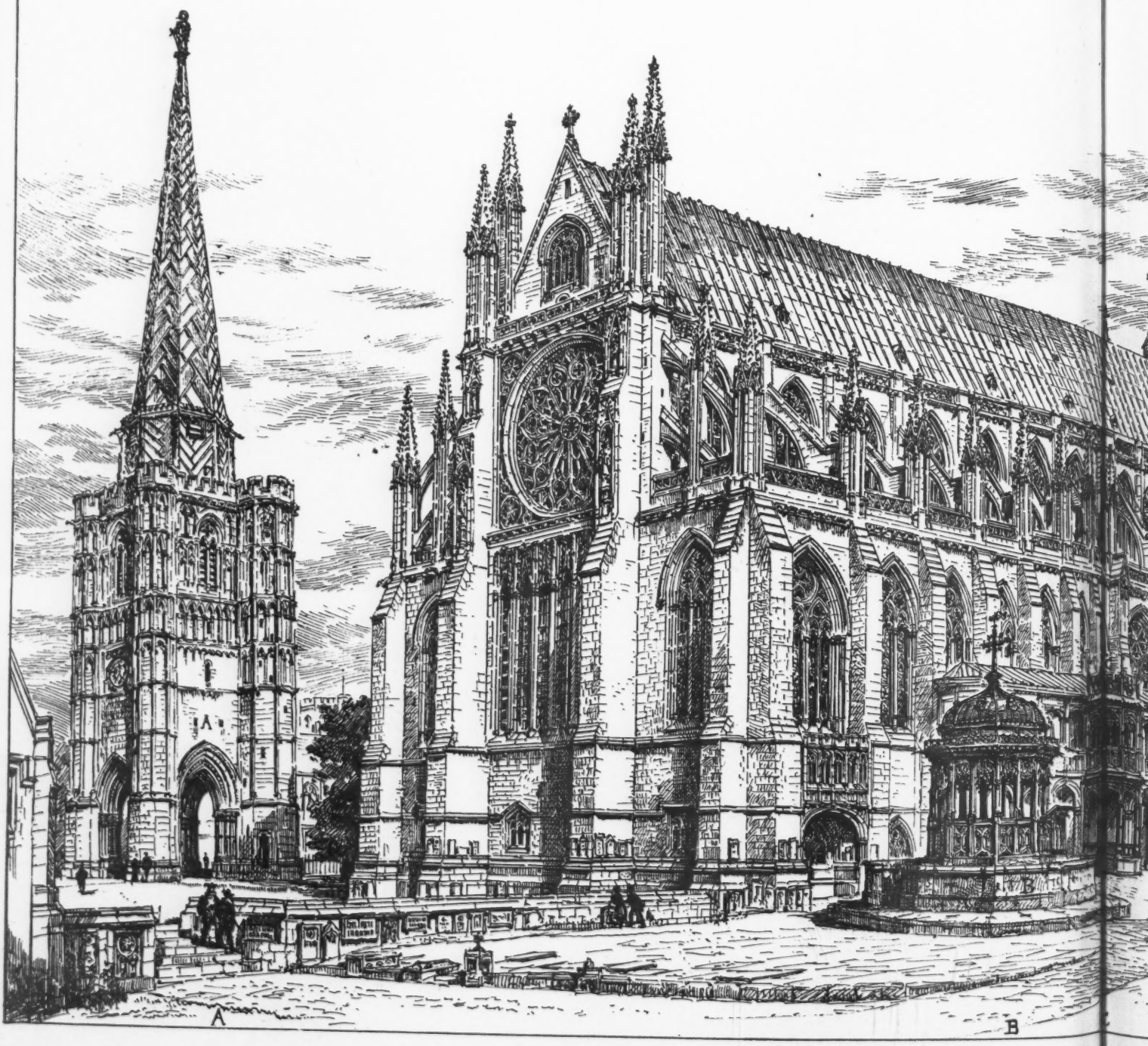
100
Feet.

engraving by Gladwin, published in 1828.

SAINT PAUL'S CATHEDRAL

Before the destruction of the Spire.

Restored from Ancient Authorities
By H. W. Brewer. 1891



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A The Clochier.
B. PAUL's Cross.
C. The Kings Closet for attending the preaching at Paul's Cross.
D. The Shrowds.
E. The Consistory
F. Shirington's Chapel.
G. Shirygtons Library.
H. Pardon Church Hawgh.
J. Bell-tower.
K. The Charnell.

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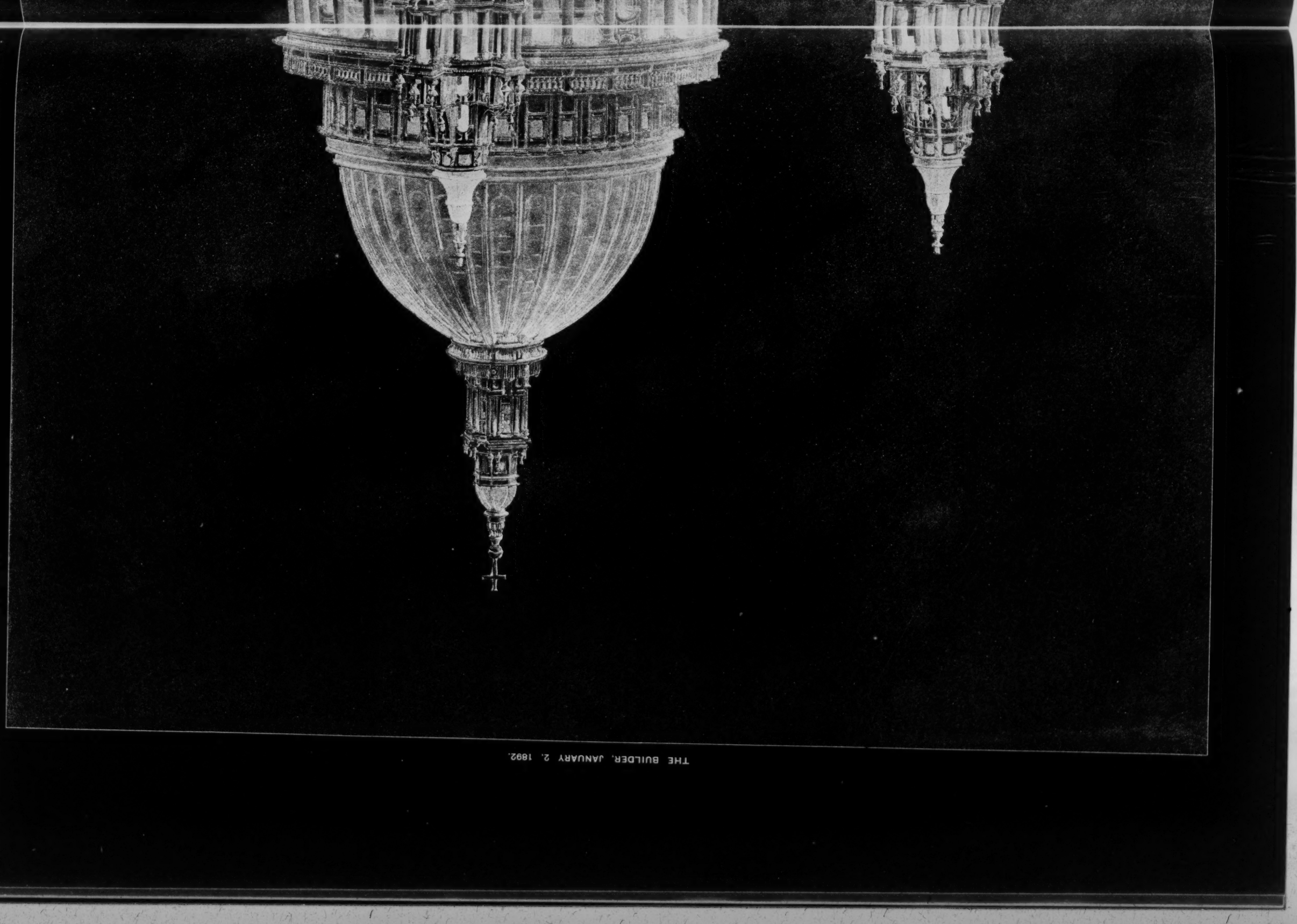

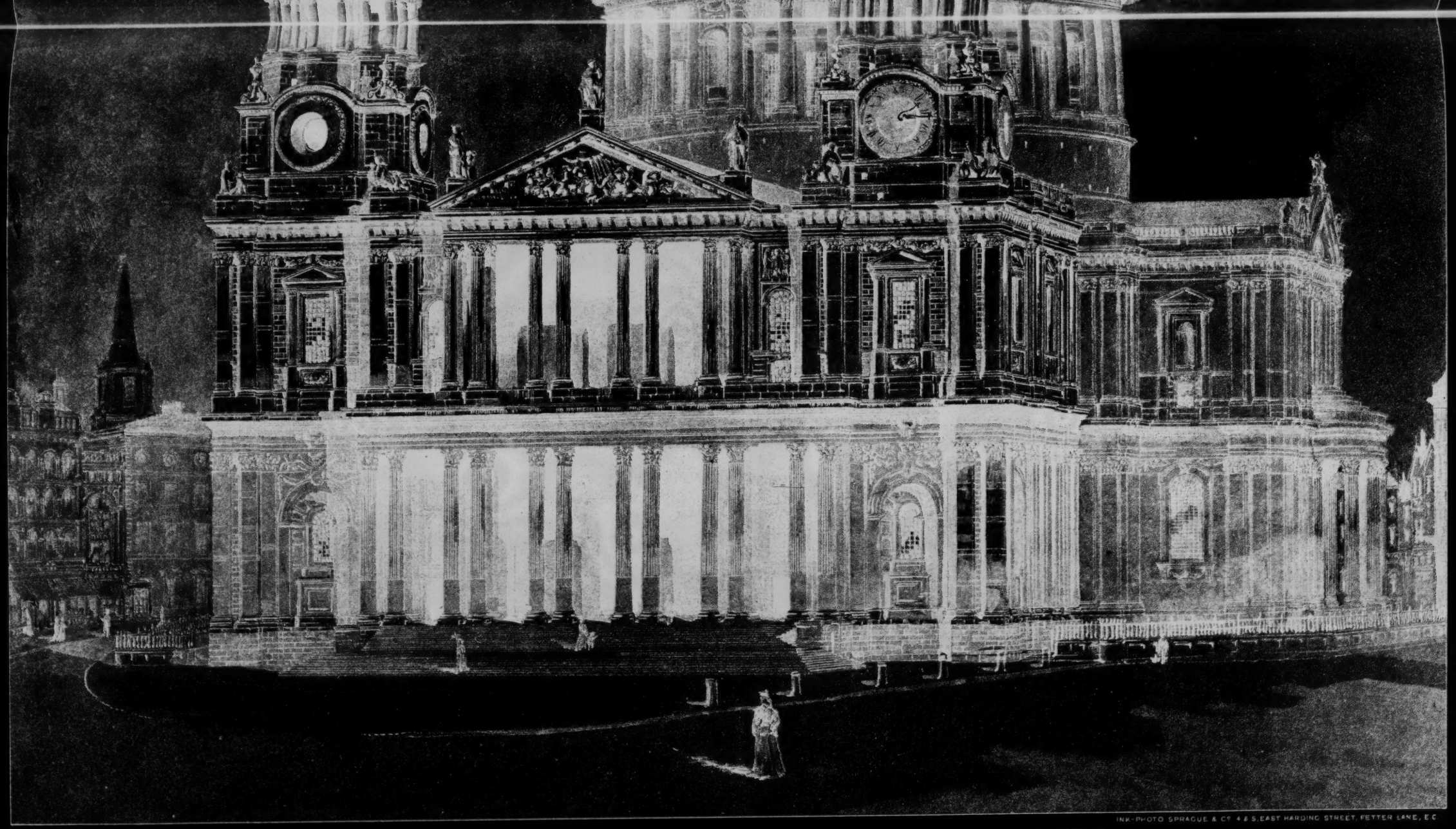

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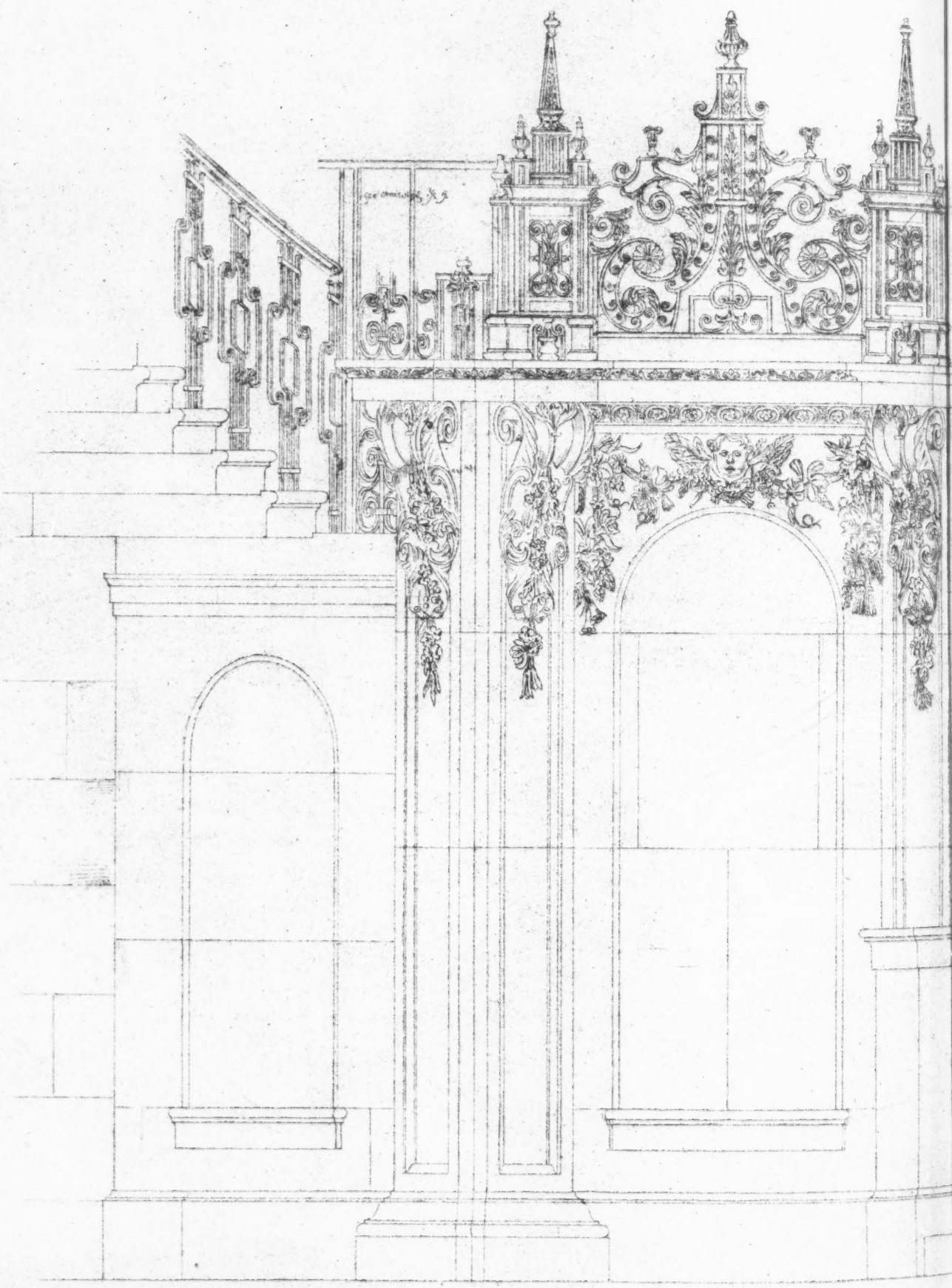
Cathedrals of England and Wales.

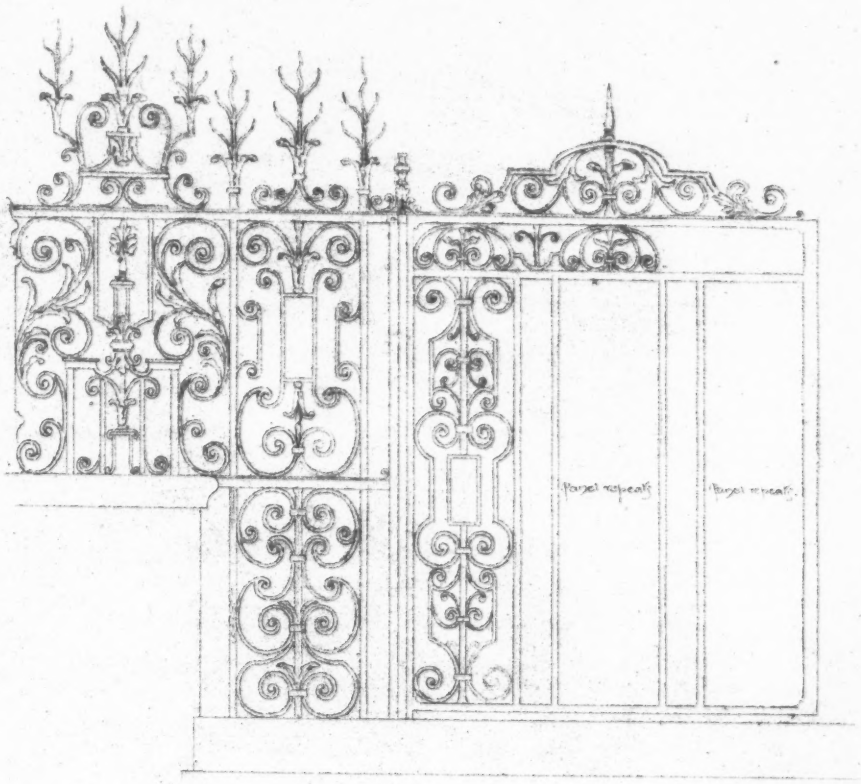
No. 13. ST. PAUL'S.—Drawn by The Editor.

St. Pauls Cathedral

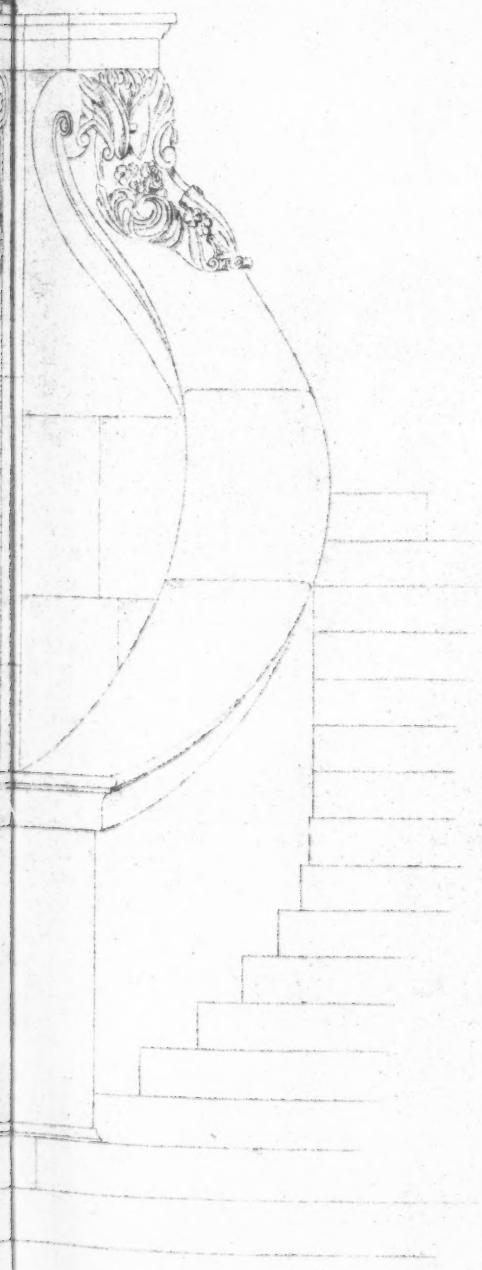
Staircase in S.W. Tower leading to Library.

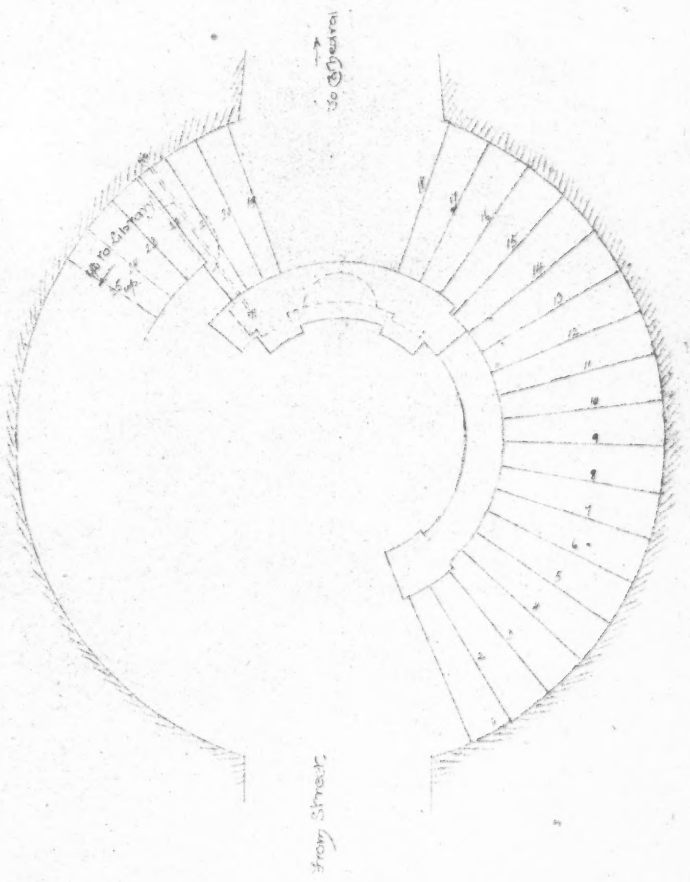


Elevation of lower part of Stairs.



Gate at ar X X on plan





Plan

Stephen Ayling Platt
Arch.

Scale for Plan

Scale for Elevations

feet

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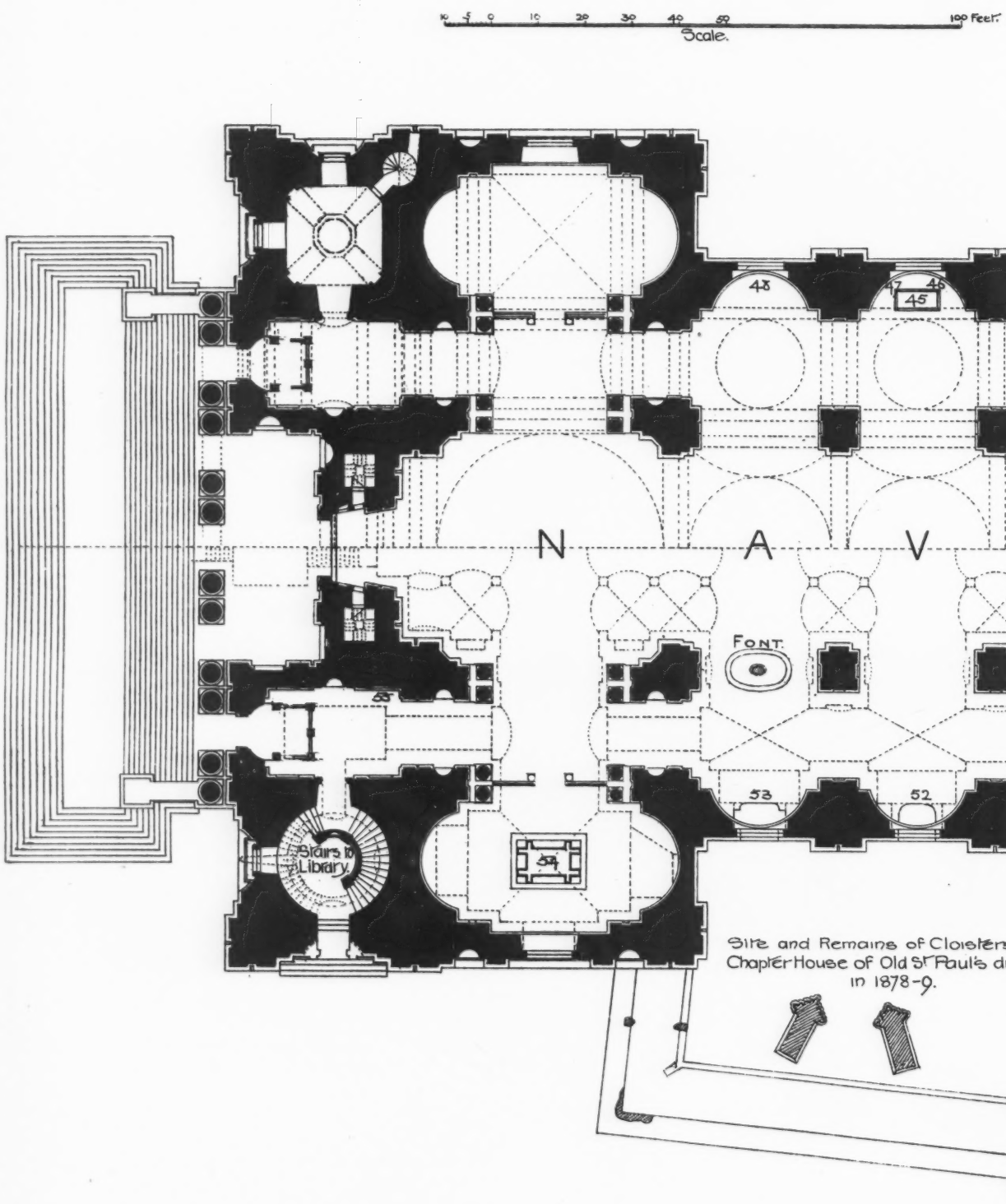
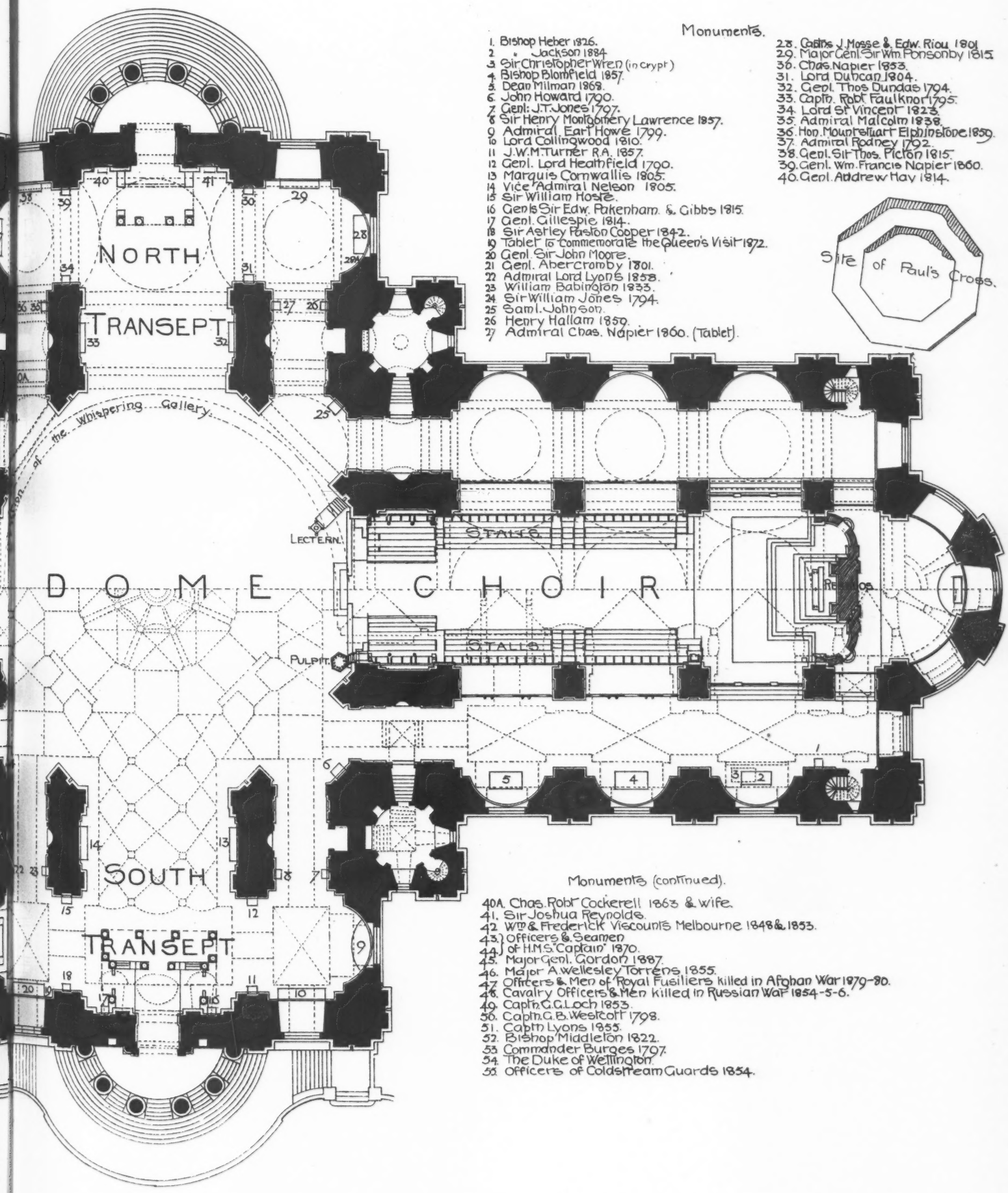
St PAUL'S CATHEDRAL.

GROUND PLAN.





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2. " Jackson 1884.
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4. Bishop Blomfield 1857.
5. Dean Milman 1868.
6. John Howard 1790.
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8. Sir Henry Montgomery Lawrence 1857.
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11. J.W.M. Turner R.A. 1857.
12. Genl. Lord Heathfield 1790.
13. Marquis Cornwallis 1805.
14. Vice Admiral Nelson 1805.
15. Sir William Hoste.
16. Genls Sir Edw. Pakenham & Gibbs 1815.
17. Genl. Gillespie 1814.
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19. Tablet to commemorate the Queen's Visit 1872.
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21. Genl. Abercromby 1801.
22. Admiral Lord Lyons 1858.
23. William Babington 1833.
24. Sir William Jones 1794.
25. Saml. Johnson.
26. Henry Hallam 1859.
27. Admiral Chas. Napier 1860. (Tablet).
28. Capts J. Mosse & Edw. Riou 1801.
29. Major Genl. Sir Wm. Ponsonby 1815.
30. Chas. Napier 1853.
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33. Capt. Robt Faulknor 1795.
34. Lord St Vincent 1823.
35. Admiral Malcolm 1838.
36. Hon. Mountstuart Elphinstone 1859.
37. Admiral Rodney 1792.
38. Genl. Sir Thos. Picton 1815.
39. Genl. Wm. Francis Napier 1860.
40. Genl. Andrew Hay 1814.

Monuments (continued).

40A. Chas. Robt Cockerell 1863 & wife.
41. Sir Joshua Reynolds.
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44. } of H.M.S. 'Captain' 1870.
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50. Capt. G.B. Westcott 1798.
51. Capt. Lyons 1855.
52. Bishop Middleton 1822.
53. Commander Burges 1707.
54. The Duke of Wellington.
55. Officers of Coldstream Guards 1854.

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